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THE BEMETEL SYSTEM OF APPRENTICESHIP TRAINING

by

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A THESIS

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ABSTRACT

This study describes the Bemetel system of apprenticeship in The Netherlands.

Data for the study were obtained from literature published in The Netherlands and by means of interviews with Dutch officials during a visit to that country in 1973. The Dutch apprenticeship system calls for a fixed program of practical training. The program for a trade is drawn up by the national organization concerned and applies to all firms offering that particular training. There are 32 national organizations in total. They must be non-profit making.

The membership of the governing boards must be such as to represent employers and employees associations, parents and the schools.

Next to the national organizations (Foundations) there are regional organizations. While the national organizations have a duty to draw up the entrance requirements, the training program and the examination requirements, the regional bodies provide information and advice and maintain contact with parents, apprentices, schools, vocational guidance institutes and employment agencies. The theory behind this structure is that the apprenticeship system has a social as well as a technical function.

ABSTRACT

This study describes the Dutch system of apprenticeship in the Netherlands.

Data for the study were obtained from literature published in The Netherlands and by means of interviews with Dutch officials during a visit to that country in 1973. The Dutch apprenticeship system calls for a fixed program of practical training. The program for a trade is drawn up by the national organization (landelijk orgaan) and applies to all firms offering that practical training. There are 32 national organizations in total. They must be non-profit making.

The membership of the governing boards must be such as to represent employers and employees' organizations, parents and the schools.

Next to the national organizations (landelijke organen) there are regional organizations. While the national organizations have a duty to draw up the entrance requirements, the training program and the examination requirements, the regional bodies provide information and advice and maintain contact with parents, apprentices, schools, vocational guidance institutes and employment agencies. The theory behind this structure is that the apprenticeship system has a social as well as a technical function.

Bemetel is a national organization, encompassing both the met-al and the el-ectrical industries.

It was found that through a corps of consultants or training officers, the Bemetel Foundation stays in close contact with the on-job training of the apprentices, and is able to monitor the quality and guide the curriculum through both evolving thought in educational methodology and new technological developments.

It was also found that a final qualifying examination technique sees that all apprentices, finishing their training period, make exactly the same testpiece in exactly the same week from exactly the same blueprints provided by the Bemetel Foundation. The testpieces are brought together in one central place where over 300 industrial experts for a period of approximately two weeks score each piece. This method, which may seem rather drastic, provides (according to Bemetel officials) the advantages of maintaining a national standard of quality and the opportunity of showing up regional or local shortcomings. Appropriate measures can consequently be introduced rapidly to overcome the shortcomings and deficiencies.

The study concludes with recommendations to continue the investigations into apprenticeship programs in other countries so that local researchers and administrators charged with manpower development can become acquainted

with systems that appear to have found answers to problems connected with apprenticeship training.

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CHAPTER I

THE PROBLEM

Introduction

The need for skilled technicians and craftsmen to meet the demands of an expanding economy and a developing industrial complex has exerted pressures on those agencies charged in Canada and Alberta with organizing the required programs.

The thrust of federal government funds for educational programs, especially those concerned with preparation for manpower requirements, made the construction of physical facilities possible. However, physical facilities are but a part of a successful program in technical and trade training.

For not all manpower training does take place in a formal school setting. Apprenticeship as an alternative method of manpower development has a long history (Butts, 1955, p. 9), where the training takes place for the greater part on the job-site rather than in a classroom.

Since the dawn of civilization, the concept of learning and training through apprenticeship has seen the young learner work (and live) with the experienced master craftsman for an agreed upon period of time for the specific pur-

pose of learning a craft.

As the trade Guilds developed in Western Europe, the apprenticeship arrangements became formal and gained status (Phelps-Brown, 1962, p. 66).

The Guilds controlled the system, and to this day it is common in Europe for the employer or trade organizations to control the apprenticeship programs and to conduct the examinations the apprentice must pass.

The formal organization of apprenticeship training in Alberta was legislated in 1944 with the passing of the Apprenticeship Act (Young and Machinski, 1972, p. 47). This Act specified the length of time to be served as well as the training requirements. Standards of competency were to be maintained by the Provincial Apprenticeship Board in cooperation with management and labour through advisory committees.

Apprenticeship in a designate trade begins for a young man or woman when he or she, and the employer, jointly apply to the Apprenticeship Board for approval and registration of the proposed apprenticeship. Work experience is gained through on-the-job training under the auspices of an experienced journeyman. Once a year the apprentice is required to attend one of the provincial institutes of technology where courses are taught to provide the necessary theoretical knowledge, and training in supporting subjects such as mathematics and science, and to provide experience in the use of machines and instruments not found in all places of employment. The total time to be served varies from trade

to trade, but is generally four years. The training courses for the apprentices at the technical institutes are generally of eight weeks' duration, but may vary from four to 12 weeks according to the trade.

At the conclusion of each training period at the institute, achievement ratings are forwarded to the Apprenticeship Branch who also conducts a final examination. Promotion to the following year's program is determined by the ratings obtained by the apprentice on this final examination and the institute rating as well as recommendation from the employers. The apprentice is issued a Certificate of Proficiency in the particular trade at the conclusion of the specified training period, having attained passmarks for the entire program.

The length of training has been set to some extent by tradition and varies from trade to trade and from country to country (International Labour Office, 1966, pp. 56-61).

Similarly, the final passing [sic] of the young tradesman into the ranks of journeyman varies with tradition (Butts, 1955, p. 157).

While examinations play a major role, in many countries emphasis is still placed upon the apprentice passing a test of practical skills.

The tradition of the Guilds required the making of a "masterpiece". Acceptance of this "chef d'oevre" showed that the training period was at an end and the apprentice had become a master craftsman.

Although examinations in related theory are sometimes set, the weight is usually much less than the practical examination (International Labour Office, 1966, pp. 110-129).

In Alberta, however, the emphasis appears to be on (theoretical) paper-and-pencil tests, rather than on examinations of practical skill. This is supported by the statement taken from Is Apprenticeship for You (Provincial Apprenticeship Branch, 1970):

> When the period of apprenticeship has been served (four years in most trades) and all courses successfully completed, the apprentice writes the Journeyman examination, and if successful, he is certified as a qualified tradesman.

As illustrated, apprenticeship is of a dual nature, by being simultaneously a method of education and of craft skill development.

More specifically, the philosophy and methods used to evaluate the progress and the skill and the knowledge gained by the apprentice vary considerably from country to country.

Considering the number of changes that have occurred in technology, and in the function and specialization of the trades, apprenticeship will continue to be a major method of training tradesmen (Muir, 1971).

To continue as a viable system, the recognition and formulation of the objectives of apprenticeship training is necessary. The determination of the principles and objectives must be undertaken in a systematic way.

T.W. Broad in his Master's Thesis (1972) proposed one such a way. In his systems approach to apprenticeship train-

ing, analysis of most major aspects is undertaken and tested for validity. As ideas are found to stand the test of time, they are employed; if not, they are modified or discarded. Consequently, the built-in quality control function provides continuous validation. The use of a systems model also provides a flow of information between different segments of the model.

Besides this locally-based research, other studies of training practices have pointed out the benefits that can be obtained by subjecting, to scholarly scrutiny, the administrative machinery and evaluative instruments used in specific apprenticeship training schemes.

Broad alludes to one such a system: the BEMETEL-Method used in The Netherlands, which seems to have found ways and means to handle with apparent success the on-the-job training and the evaluative aspects of apprenticeship programs.

In his Recommendations for Further Study he writes:

> A study of Bemetel Foundation's method of assessing and scoring practical examinations is a necessary further step in instituting a scheme of apprenticeship. It is recommended that as part of such a study the researcher or researchers pay a visit to the Bemetel Foundation, Holland, to view and discuss the designing as well as the method of scoring these examinations.

He continues:

> This study could also develop the Bemetel method into areas of practical work in which it does not appear to be used as yet, but where preliminary work carried out during this present study indicates that it might have an application (Broad, 1972, pp. 122-123).

In recent times, the Alberta concept of apprenticeship

training has received criticism. The complaints, which indicate that the existing system is not keeping pace with the changing demands can be broken down into five major categories:

1. Little recognition is given to the fact that technological developments are changing the traditional craft skills.

2. Many of the existing training manuals used by apprentices tend to stress skills required in the past rather than those that will be needed in the future.

3. Insufficient attention is paid to defining the likely future needs of individual apprentices.

4. Great concern is voiced about the quality of much of the on-the-job training.

5. Poor integration is evident between the off-job educational practices and the experienced gained on the job.

These categories of complaints are both common and widespread.

The 1970 report of the Alberta Department of Labour dealing with the Apprenticeship and Tradesmen's Qualification Branch lists (on page 8) "some problem areas".

> The quality of field experience of apprentices varies greatly. There are some ten thousand establishments in the Province where apprentices are, or could be, employed. In some the opportunities for a broad working experience are excellent - in others the possible scope of apprentice work experience is limited. In some the training capability of the supervisors of apprentice work is high - in others little attention to training needs is possible; the responsibility may even not be accepted.

> Apprentices are reasonably free to transfer and many do. The Board has a limited number of men in the field providing some guidance and direction. The Work Record Book focuses attention on the need. But the objective of a broad working experience for all is some distance from being realized.

Next to the above problem in the area of field experiences, the report continues to deal with training needs and states:

> True training needs are difficult to identify. The task of program development and maintenance must of necessity involve industry - there could be no program without the support of the workshops of the Province. Training schools must also have a voice if they are to be encouraged to provide quality instruction. All of this tends to bring needs into focus that are not necessarily the needs of the working tradesman - the aspirations of Unions with respect to their jurisdictions; the aspirations of management with respect to its contracts; the aspirations of schools and instructors with respect to the dimensions of their operation; even the aspirations of administrators of the program. Having established true needs, if this were possible, the real "crunch" comes in determining what else is essential to keep the machinery well oiled - surely a task for Solomon himself.

The above statements indicate that it will indeed be a valuable exercise to research how other administrations have dealt with these problems of apprenticeship training.

Purpose of the Study

The general purpose of the study is to describe the BEMETEL system of apprenticeship training and evaluate whether that methodology can be employed to alleviate problems encountered by the Alberta system. The relevancy of the BEMETEL methods will also be evaluated against an apprenticeship training program based on a systems-approach model,

as proposed by Broad.

Significance of the Study

Much research has been carried out in the fields of general education, especially primary and secondary education. Problems related to post-secondary education in community colleges and technical institutes, dealing with their staff and students have also, especially recently, been the concern of researchers. Not too much attention however has been paid to problems associated with apprenticeship training, although as an educational tool the method is gaining rapidly in popularity. Alberta Advanced Education and Manpower reported that in 1977 training was provided for 16,756 apprentices as compared with 8,905 students in other mainly two-year technical program areas (Annual Report, 1977).

The study should be significant not only to administrators of apprenticeship programs, but to all individuals or organizations that support apprenticeship training agencies by taxation, donation of time and expertise or by other means.

All those involved (and this includes certainly the apprentice) ought to expect that the energies and resources are directed and aligned with the requirements so that they efficiently provide the need of skilled manpower.

Any program to be effective requires continual reassessment and research and, with little done in the apprenticeship training area, it would appear that such a study is

both timely and necessary.

The Bemetel system of trade training has drawn much attention from other countries. In recent years, Bemetel features have been studied in detail by researchers from Great Britain, Sweden and Italy (Bemetel, n.d., p. 22). It is hoped that an evaluation of the system will also be of benefit to the improvement of the Canadian and especially the Alberta Apprenticeship Program.

Delimitation of the Study

The study is confined to two areas of apprenticeship training programs: the monitoring of the on-the-job training aspects, and the evaluation of training results. The basis for the restriction is the belief that more value may be derived from a narrow in-depth analysis than from a survey covering apprenticeship systems in their entirety. The consideration appears to be justified, since industrial training varies between geographical areas and is dependent on political, social and economic philosophies.

Also a study of a total program examined in the light of another will tend to become unwieldly.

Limitations

The findings of this study are dependent on the openness and frankness with which all those queried respond, and

on the level on which the socio-economic climate in the geographical areas under consideration can be equated.

The information regarding Bemetel is limited to publications by Dutch writers and the respondents involved in the Bemetel program.

Definitions of Terms

The following definitions were found appropriate and were selected for terms that will be used throughout this study.

Apprentice

An apprentice is a person who enters into a contract with an employer for the purpose of learning a skill.

Apprenticeship

Apprenticeship is a legal agreement (indenture) whereby one individual (group of people) agree(s) to serve another individual (group) for a prescribed period of time in return for instruction in a trade, art or business.

Bemetel

Bemetel is the Dutch acronym for the BEdrijfsopleiding METaal (en) ELectrische (Industries), which literally translates as Training (for) Enterprises Metal (and) Electrical. This is an independent non-profit foundation for vocational

training in the metal and electrotechnical industry.

Certificate of Proficiency

A Certificate of Proficiency is a certificate issued an apprentice who has served the required time and passed the required examinations. It entitles the holder to practice in the specified skill area. It is often referred to as a Journeyman's Certificate or "ticket".

Journeyman

A journeyman is a person who is recognized as being a qualified tradesperson by the granting of a certificate of proficiency.

On-the-Job Training

On-the-job training is a structured, coordinated work experience, which, combined with related information, meets the established objectives of (trade) training.

Work Experience

Work experience is the part of the apprenticeship program where the apprentice is learning under the guidance of a journeyman at the place of employment.

Organization of the Thesis

The introductory chapter states the problem and the

need for research. The search of relevant literature on apprenticeship and related studies is presented in Chapter 2. Chapter 3 describes the investigative method and the collection of data.

Analysis and discussion of the data is presented in Chapter 4.

Finally, Chapter 5 summarizes the findings and offers conclusions and recommendations resulting from the project.

Summary

In this chapter a brief description was given of apprenticeship, its development and trends, and the position it takes in manpower development.

Based on statements regarding the Alberta situation made by the Trade and Certification Branch of the Department of Advanced Education and Manpower, and on a recommendation made by T.W. Broad, the assumption was made that a study of the Bemetel System of apprenticeship training in The Netherlands would be beneficial.

Five key complaints are listed as well as some problem areas the Alberta authorities have identified. The terminology to be used is defined and the chapter concludes with an organizational outline of the remainder of the study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Studies on apprenticeship training reveal a number of points that are relevant to this study.

Such matters as training both on and off the job were discussed and inquiries were conducted into testing and examinations, since this issue appears to be central to the study.

Also it was thought necessary to look at suggestions for change. Such suggestions are readily provided by journalists, politicians, educators and students. A common characteristic to many of the suggestions is that they are based on personal beliefs and philosophical thoughts. Undoubtedly, a major function is to be fulfilled by the philosopher in regard to education. Increased emphasis must, however, be placed upon the findings of research to help in making wise decisions.

Students are increasingly challenging the relevancy of the curriculum; and the taxpaying public is demanding accountability of the educator.

Decision-making has to be based on theory, which in turn is based on valid research. Mort and Ross (1957, p. 4) illustrate the point when they state that

> Action divorced from theory is the random scurrying of a rat in a new maze. Good theory is the power to find the way to the goal with a minimum of lost motion and electric shock.

Research in the physical sciences has generally been well accepted, probably due to the applicability of the findings. Research in the social sciences however has received less support. Ingram (1972, p. 207) listed as reason:

> A major criticism of the uncoordinated, fragmented, overlapping approach to educational research is that it has a minimal impact on policy and practice.

Since apprenticeship training as an educational method is both widespread and common, the search included an inquiry into the attitude as it pertained to the acceptance of this method of education both from the apprentice's point of view and from society at large. In turn the review will look at the method of apprenticeship training in general, covering Canada, the United States, the European countries and Japan. An in-depth look will then be taken at apprenticeship in Alberta, Ontario and The Netherlands. In the latter instance both from the legal and organizational points of view.

Since "examinations" are a vital issue, this aspect will be researched in general and that part of the literature that applies will be reviewed. The Dutch approach to qualifying examinations will be described in detail in Chapter 4. A short overview of developing trends and attitudies concludes the chapter.

Apprenticeship Training

In comparison to other areas of education, insufficient studies on apprenticeship training have been carried out in North America. The studies that have taken place in Canada incline towards the economic value of apprenticeship. For instance, the exhaustive study by Hathaway, titled The Cost and Benefits to Employers of Apprentice-Machinists in Ontario (1978).

A possible reason for the lack of published and unpublished literature may be the informal and often private e.g., industry or union based, organization of apprenticeship programs in the United States of America. In Canada the organization and control rest generally with branches of the provincial governments, but many corporations carry on a system of their own. The latter are in existence with Canada's railroads and airlines, while the Armed Forces also operate a highly structured scheme (Broad, 1972, pp. 32-36).

Although apprenticeship is one of the oldest methods of training used by man, it has changed little over the years. Muir commented that,

> Despite the number of changes that have occurred in technology, in approaches to training, in learning theory and in the function and specialization of the trades, the skills of the trade are still passed from journeyman to apprentice in much the same way as was done under the guild system. The only real major change which has occurred in the system of training over the centuries has been the introduction of the trade school into the system (1972, 1, p. 1).

Studies by Muir (1971) and Bernier (1971) found that

while there was controversy concerning the structure and content of apprenticeship programs in Canada, the acceptance of apprenticeship as a system of preparing skilled manpower was almost universal. Some experts in the United States say their apprenticeship training system is moribund while others say it is the most effective way to train workers for careers in the skilled trades.

In Canada, apprenticeship has grown steadily over the past quarter of a century. Although apprenticeship training is under the jurisdiction of the provinces, the rate of growth has depended largely on the financial support provided by the federal government (Department of Manpower and Immigration, 1968, p. 2). The federal government has been involved in providing assistance to the provinces for apprenticeship training since 1944. Muir draws an important conclusion regarding the development of the apprenticeship system in Canada:

> The renewed interest in apprenticeship was sparked by the federal government and their willingness to invest heavily in apprenticeship training (1971, p. 19).

Nearly all of the literature reviewed on Canadian apprenticeship training is written in a positive tone, and any criticism is constructively aimed at advancing the cause of apprenticeship training. Typical of the wide support given apprenticeship training is this statement by the Apprenticeship Training Committee of the Canadian Construction Association at its 46th annual meeting:

> The Association has decided to accelerate its activities to promote apprenticeship training after having concluded that employment opportunities, increased production and improved workmanship were becoming more dependent on the education and trade training of the Canadian Labour force (1964, p. 191).

Apprenticeship training in the United States has not had such unqualified support. In fact Feisil maintained that:

> Apprenticeship is not an important source of training in the United States.... Relative to the working population under age 20, the number of apprentices is miniscule compared to the proportions of apprentices in Great Britain (1968, p. 127).

Foltman wrote that:

> Many thoughtful students of this aspect of industrial training seriously believe that apprenticeship is now obsolete (1964, p. 28).

He elaborated on this by saying:

> Technological and occupational changes; changing attitudes toward skilled occupations; reluctant employers; reluctant unions; and a relatively small staff for promotion - all of these militate against the creation of apprenticeship training programs (1964, p. 33).

However, apprenticeship training does have its advocates in the United States, many of whom are or were in a position to influence the course of apprenticeship training. George Meany (cited by Foltman), speaking as President of the AFL-CIO, contended:

> There is general agreement that the demand for skilled workers will grow very rapidly in the next decade, while the opportunities for unskilled workers will continue to shrink. Therefore, our interest and the national interest must look to an across-the-board increase in apprenticeship training (1964, p. 30).

Some of the writers in the United States blame the demise of apprenticeship on lack of data and knowledge. Murphy felt that:

> The basic facts surrounding apprenticeship have been for too long a matter of individual experiences, conjecture and periscope observation (1967, p. 108).

And Christian observed:

> Skill development which combines instruction in theory with actual practice and controlled experience on the job is the best means of skill development for occupations beyond the routinely manipulative. For this and other reasons we seek to refine, improve and extend apprenticeship concepts rather than scuttle them (1964, p. 625).

Apprenticeship in Europe

Extensive and detailed reports on the European approach to apprenticeship have been published by the International Labour Organization (I.L.O.) with headquarters in Geneva.

Although the industrial revolution did send the apprenticeship system especially in England into a decline (Ashton, 1964, p. 78), the willingness to change and adapt to a new industrial world (International Labour Office, 1966, p. 183) has created a new vitality with the result that the European apprenticeship system is showing marked increases in the number of apprentices each year (International Labour Office, 1966, pp. 179-197).

The Office of Manpower, Automation and Training (O.M.A.T.) of the United States Department of Labour financed a study of apprenticeship in eight European countries. The study was carried out by the Center for Information and Research (C.I.R.F.), the research branch of the International Labour Organization. The study showed that:

> In six of the eight countries - Austria, Czechoslovakia, Denmark, Germany, Switzerland, and the United Kingdom - apprenticeship is the principal means of acquiring recognized trade qualifications (1966, p. 14).

Taking 1950 as a base year, all eight national systems showed a marked increase in the number of apprentices over the previous years, while the populations remained stable.

The systems studied in Europe had a number of basic concepts similar to apprenticeship systems in the United States and Canada. The International Labour Organization outlined four of these:

> 1. The transition of adolescents from full-time education to adult work should, wherever possible, be organized as a period of training in employment.
>
> 2. There should be special legislation for each major trade and occupation and detailed regulations to determine the relations between adolescent workers and their employers and the standards to be attained in training.
>
> 3. Public authorities, working in close cooperation with employer's and worker's organizations or semi-public bodies composed of representatives of industry and the trades, should supervise and control the implementation of these regulations.
>
> 4. Training should include both theoretical and practical instruction and should be provided within the hours of a normal work week (1966, p. 11).

The International Labour Office noted that research projects are being launched that examine the many facets of apprenticeship training, not only the period of training but also the training methods and the training syllabi (International Labour Office, 1966, pp. 179-197).

Similarly in Japan (maybe even more so than in Europe), apprenticeship is used as a specific tool for the development

of the manpower a modern industrial country requires. The goal of developing skilled tradesmen that are versatile and possess in-depth knowledge of their trades is clearly stated (Okamoto, 1970, p. 7).

Apprenticeship in Alberta

The Manpower Development Act provides for the establishment of a provincial board known as the Alberta Apprenticeship and Trade Certification Board, consisting of a Director and not less than seven members to advise the Minister on all matters concerning the apprenticeship system.

The Director is assisted by a clerical staff, responsible for the administrative aspects of the system. A group of Program Development Officers coordinate courses and curricula. They organize the school programs, and administer examinations.

There are also local and provincial advisory committees. The local committees hear concerns of employers and apprentices in matters pertaining to the training of apprentices and make recommendations concerning such subjects to the provincial Board. The provincial committees are made up of members from each of the local advisory committees and, according to Muir, make recommendations regarding the trade or trades they represent on:

(i) qualifications concerning the age of apprentices;

(ii) length of time for apprenticeship;

(iii) the number of apprentices who may be apprentices to each employer;

(iv) the content of the courses to be given at the trades training school or center;

(v) the establishment of standards of proficiency to be reached during each year of apprenticeship and the setting of the final standard of competency upon which journeyman status is granted; and

(vi) to conduct such practical tests and written examinations as may be deemed necessary to prove attainment of the desired standards (1971, p. 66).

The training programs leading to the position of journeyman are also under the direction of the Apprenticeship and Trade Certification Branch. The Branch summarized the training given as follows:

> An apprenticeship training program under the provisions of the Act has its beginnings for a trade or industry when those (or their representatives) engaged in that trade or industry make petition to the Minister for designation under the Act. Apprenticeship in a designated trade begins for a young man when he and his employer jointly apply to the Branch for approval and registration of their proposed apprenticeship. Contracts are signed by all concerned. Providing a broad working experience and on-the-job training is the employer's responsibility. Technical school training is provided at public expense - costs being shared equally by the Provincial and Federal governments under the provisions of the Technical and Vocational Training Agreement and the Apprenticeship Agreement. Courses are offered mainly at the Northern Alberta Institute of Technology and the Southern Alberta Institute of Technology.
>
> Standards of training and competency are established and maintained by the Apprenticeship and Trade Certification Branch working in cooperation with management and labour in industry and with personnel of the technical schools. Provisions are made to award credit to those who approach apprenticeship with a background of technical education and of experience. The opportunity of education upgrading is provided for those who are selected by industry and who are unable to display the competency in basic educational skills

> considered essential for successful performance in a particular program. All who serve the working time, complete the technical school program and pass established examinations are awarded the Completion of Apprenticeship Certificate (Preface).

Under the Adult Occupational Training Act (April 1, 1967), the federal government agreed to pay training allowances to all apprentices who had been in the labour force for three or more years. An amendment to the Act now permits the payment of training allowances after one year in the labour force. Currently the training allowances are for a part of the apprentices provided via the Unemployment Insurance Commission.

Apprenticeship in Ontario

Similar legislative arrangements exist in the other provinces of Canada and need not be reviewed in detail except that mention should be made of a variation to the general scheme in the Province of Ontario.

The Ontario apprentice training system followed a suggestion proposed by the Canadian Manufacturer's Association called training blocks. Training blocks in a trade area are sufficiently common to be used as a training core for the area (Broad, 1972, p. 56).

Each block in the Ontario plan has a terminal objective and performance standard that the trainee must meet in order to receive accreditation for the block. Training blocks are assembled to suit a particular training need

(Dempsey, 1970, pp. 16-24).

A similar system exists in the Maritime provinces under the designation DACUM.

Apprenticeship in The Netherlands

The status and development of apprenticeship in The Netherlands required a detailed and in-depth search, since BEMETEL is "part-and-parcel" of the existing traditions, characteristics, and legislative regulations of the Dutch approach to trade training. The literature search, which included the Consulate-General of The Netherlands in Vancouver and the Embassy in Ottawa, produced a most useful pamphlet under the title VAKOPLEIDING and published by the Stichting Vakopleiding Bouwbedrijf (1972).

Gregoire (1972, p. 29) refers to "stichtingen" and translates the term as Institutes, stating that they supervised apprenticeships; being in fact the governing bodies made up of employers and labour. Gregoire further reports that the government has no power to influence the decisions made by these Institutes, but that the Dutch Federal Government does pay all net costs for apprenticeship programs. There is an Institute for each main branch of industry, but there are no rigid lists of recognized trades. Trade standards are flexible, so firms have considerable freedom in the training of their apprentices (Gregoire, 1972, pp. 30-45).

Considering that what Gregoire calls Institutes must

by (Dutch) law be non-profit organizations, a better translation of Stichting would be Foundation and the following translation, severely condensed provides nevertheless an overview of the approach the Dutch use regarding apprenticeship training.

Apprenticeship - Legislation

The apprenticeship scheme in The Netherlands was first regulated by law in 1919 (the Technical Education Act). The purpose of the Act was to encourage vocational training with Government support. It opened two ways of training as a skilled craftsman: the trade school and apprenticeship. Preference was given to the school. Since, in many places, there were no schools, however, the apprenticeship scheme acted as a substitute.

During the Depression in the 1930's, the apprenticeship scheme did not develop as desired. However, after 1945, it began to flourish as a result of industrialization and the attendant demand for skilled craftsmen. Both the number of participating firms and the number of apprentices grew. Another important point is that the apprenticeship scheme developed into a continuation of the work of elementary vocational schools and general schools. In 1968 the Technical Education Act was replaced by the Apprenticeship Act. The apprenticeship scheme in The Netherlands has a number of peculiar characteristics. These are:

1. Participation in the scheme is in principle entirely voluntary, both for firms and employees.

2. The apprenticeship scheme is open to all trades. So far the technical occupations have been by far in the majority, though there are also training schemes in the agricultural sector and (for girls) in the domestic occupations (family, home helps, domestic workers, mothers' helps, and hairdressers). Preparation is going ahead in schemes for office workers.

3. The formal basis of the training is an apprenticeship agreement, which has to be drawn up in writing. Like an employment contract, the apprenticeship agreement creates an employer-employee relationship.

An apprenticeship agreement may be concluded solely with a young person who is above compulsory school age and younger than 27 years. He must at the same time satisfy the entrance requirements included in the practical work programme.

Every apprenticeship agreement specifies a probationary period during which the agreement can be terminated at any time by either party. The probationary period may be anything up to three months, and is not additional to the training period, but part of it.

During their training apprentices receive the rate for the job according to the collective labour agreement in force. It is compulsory for apprentices to attend classes in vocational and general subjects, and if these are held in working hours they may be released on full pay.

4. There is a fixed programme of practical training. The programme for a particular trade is drawn up by the national organization concerned and confirmed by the Minister. The fixed programme applies to all firms offering that particular training. The programme must include the entrance requirements, the length of the training and the examination requirements at the end of the apprenticeship.

Provision is made for both elementary and advanced apprenticeship training and courses, though advanced courses are only available in certain trades and are open only to those who have completed the elementary course.

The length of elementary apprenticeship training is at least two years.

The length of an advanced training course must be at least one year.

5. In addition to practical training, apprentices are required to attend classes in general and vocational subjects at a school designated in the apprenticeship agreement (by mutual arrangement). These classes used to be held almost exclusively in the evenings, and there are trades in which this is still the case (about 30 percent of all apprentices). There are others in which apprentices attend some classes during the day and some in the evenings, or on day release for one day a week. General and vocational classes have no point unless the connection with the practical training is made clear to the apprentices. The view is gaining ground that the classes must function as an aid to the appren-

ticeship training, special attention being devoted to the personal and social development of the apprentice. Another important step forward has been the idea of concentrating these classes, which were formerly held in lower vocational schools, in separate establishments known as apprenticeship training schools, eight of which are now in operation. A plan for opening schools of this type all over the country is now in preparation.

6. The organizational bodies of the apprenticeship system are Foundations whose task is to foster the development and the proper functioning of the apprenticeship system. They must be non-profit-making.

There are national and regional bodies. The membership of the governing boards must be such as to represent employers and employees associations, parents and the schools.

There is only one national organization per trade category. A trade category is made up of trades which are clearly associated, irrespective of the industries in which they occur. The national organizations have the duty to draw up the practical training programme, to arrange examinations and to assist in the conclusion of apprenticeship agreements.

The regional bodies are responsible for an area comprising a province or a part thereof. They provide information and advice in their region, and maintain contact with parents, apprentices, schools, vocational guidance institutes and employment agencies.

The existence of national organizations for apprentice-

ship agreements per trade category and of regional organs for all apprenticeship agreements within their region is a structure that may be characterized as a system of common occurrence. The theory behind it is that the apprenticeship system has a social as well as a technical function. The national organizations are mainly responsible for the technical aspect, and the regional ones for the social aspect.

The governing bodies can call on the service of clerical staff and consultants, who are responsible for the supervision of compliance with the apprenticeship agreements and for the promotion of the apprenticeship system in general.

7. All trainees take an examination at the end of their apprenticeship. These are arranged by the national organizations and run by boards of examiners appointed by the Minister. Employers are obliged to give apprentices time off to take the examination.

The examination comprises both theory and practice. Successful candidates are awarded a certificate.

Trade Examinations in General

The key difference between a student and an apprentice can be said to lie in the location where each receives his schooling. For the former, this is nearly always in a formal classroom setting, for the latter it takes place on the job site.

Consequently, it follows that an apprentice, to show

his skills and abilities and his worth to his employer proves that he can, in the work-situation, perform the required tasks. Depending on how well an apprentice performs, a prediction can be made of his success in the trade and his usefulness to his employer.

Otis and Leukart write:

> Workers show their value to a company in their ability to perform jobs and their individual worth is reflected in other ways than production alone. Such factors as receptiveness of supervision, attendance, quality of work, ability to get along with others are examples (1956, p. 443).

The standard of performance that an apprentice should meet to indicate successful completion of his indenture should, according to Smith (1964, p. 60), be the objectives of the training program. Smith implies that these should be stated only in behavioral terms. Evaluation during the period of training to indicate a pattern of development is considered a complex matter. There is agreement that judgments on performance without fixed and stated objectives are inherently subjective.

Seashore and his industrial psychologist colleagues, doubt whether job performance measurements are indeed valid. They claim that the size and direction of the correlations of job performance variables were more variable than could be expected on the basis of measurement and sampling errors. They felt that job performance measurement had limited validity and would remain at a primitive and empirical level until some complex theory of job performance was created

(Seashore _et_ _al_., 1962, pp. 215-217).

The International Labour Office is of the opinion that the apprentice is the most vulnerable partner in the indenture agreement and recommends that judgments of apprentice performance should receive close scrutiny (I.L.O., 1966, p. 105).

The literature is generally in agreement that supervisors and instructors of apprentices have to keep the trainee informed of his progress and provide him with the necessary advice and assistance, even if the bases for this are founded on judgments and opinions.

The argument in favour of using evaluation is that feedback of some form is a human requirement and the apprentice is in need of some indication from his supervisor regarding his performance. The higher the degree of frankness employed in outlining the expectations and the performances, the better the worker and the company learn to understand each other's interest and goals (Hutchinson, 1963, p. 61).

The request (or maybe better stated, the demand), by Smith that the performance standard (in trade training) be stated only in behavioral terms and preferably at the completion of the training period comes very close to the European apprenticeships. In general, in nearly all European systems the apprentices take only one examination set at the end of their period of apprenticeship by the authorities controlling apprentices. Intermediate examinations are sometimes arranged on a voluntary basis to assist in identify-

ing deficiencies (International Labour Office, 1966, p. 113).

The two kinds of performance standards commonly employed are accuracy and speed, with the former generally receiving the greater emphasis.

Under accuracy, the first standard, two factors are to be considered, namely the percentage of answers that have to be correct, or on practical tests the percentage of dimensions to be correct and the second consideration, within what tolerances must these answers, or dimensions be.

The second standard, dealing with time constraints is simpler to determine, but the difficulty arises whether the penalty assessed for going over the time limit is to be given the same value as the reward for staying below the set time frame.

The writings of Robert F. Mager on developing instructional objectives have contributed to the setting of performance standards in behavioral terms.

Even with the assistance of the writings of Mager and Gronlund, there are still difficulties in determining to whom the trainee is to demonstrate the standard he has attained, especially in apprenticeship training. Is the demonstration designed to satisfy the instructor, the employer or the examination committee? Another point is, where does the acceptable balance appear between accuracy and quality, for instance in judging the soundness of a weld.

While the European scene favors the performance on the actual job site, Bemetel calling it the "preferred

situation", the (British) Industry Training Board, which is influenced by the Bemetel philosophy, states in their mimeographed pamphlet Practical Testing for the Trades Apprentice:

> When testing is carried out in training centres, productive work should normally be used.

The Canadian and Alberta approach tend in general to measure more the ability of the apprentice to prove his mastery of the knowledge involved in the task rather than proving the skill elements of this task.

John P. Foley has written very lucidly on performance testing, especially as it applies to military training. He says:

> From our public schools and universities, we have a long tradition of measurement, complete with techniques for making tests reliable, for making them discriminate well among students, for making them of equal difficulty, etc. So far as (Air Force) training is concerned, there is only one catch. We are usually not interested in how well a student answers questions on a test. What we really want to know is how well he can diagnose trouble in a radar set, fabricate sheet metal or repair a motor.
>
> We should, therefore, concentrate our efforts towards grading on practical performance or work sample. Tests that duplicate, as closely as possible, the performance that will be required of the student on the job (1963, pp. 2-5).

If it appears, as suggested by Foley, that on-the-job performance is the preferred approach not only to training but also to examination, why is there not a wider application of the philosophy? One reason is provided by Harris who writes:

> ...it appears that the reason that practical tests are not more widely used is that satisfactory practical tests have not been developed (1962, p. 28).

The other reason is that the scoring of practical work generally lacks a rating scale. Remmers and Gage remark that there is an uneasiness using "non-symbolic activities of educational endeavour" (1955, p. 153).

The two-fold scoring of practical work products, the required attribute or dimension measured is present or absent, is good or bad, lacks the refinement in evaluation the educational world is accustomed to. Scaling techniques for rating work products are being tested, but the reliability of the judges remains a weak link.

An important dimension that cannot be overlooked; and somewhat akin to the well known phrase that justice must not only be done, but also appear to be done; is the attitude of an individual towards taking tests. This was summarized by O.G. Brim with the statement:

> If a respondent believes that standardized tests of ability are accurate, or that his performance on such tests accurately reflects his real intelligence, he will be more likely to hold positive rather than negative attitudes towards taking these tests (Brim et al., 1969, p. 97).

To obtain objectivity in performance tests by stipulating the test conditions of time and accuracy to maintain a satisfactory standard of craftsmanship, great efforts have been expanded by the Bemetel Foundation in Holland.

Chapter 4 describes their approach and methods in detail.

It has to be recognized though, from the outset, that both training and examinations meeting the objectives set

for apprenticeship training are not obtained by chance, but are deliberately planned by those at various levels of responsibility, who are charged with the task of the preparation of skilled tradesman.

Trends and Attitudes

The International Labour Office has noted that the vitality of the European apprenticeship system is apparent in its willingness to change and to adapt to a new industrial world (International Labour Office, 1966, p. 183). Also noted is that apprenticeship training is in a period of rationalization. The period of apprenticeship is being examined as are training methods and examinations. Research projects are examining many facets of apprenticeship training, to offer solutions to the many pressing problems which have been identified (International Labour Office, 1966, pp. 179-197).

It appears then that apprenticeship has declined under practices that used apprenticeship training incorrectly.

Industrialization created partly in sequence and yet also simultaneously two entirely different, opposing aspects to the training of craftsman. On the one hand the division of labour broke down the old skills into many small parts. This division of labour so well described by Smith in the pin factory example (Smith, 1920, p. 6), was continued by Frederick "Speedy" Taylor and his Scientific Management.

The School of Scientific Management studied each manufacturing process and broke it down into smaller tasks which the worker had to follow, since it was the most efficient method to reach the production target.

This degrading of the skills of the crafts found strong worker opposition, but management also discovered disadvantages as more sophisticated technologies were applied to industrial processes. These new technological developments required not only that the worker was conversant with a broad spectrum of skills, but even more so that the tasks performed provided job satisfaction.

Eli Ginzberg of Columbia University in a lecture at the University of Toronto discussed these aspects with insight when he stated:

> The average worker is increasingly less willing to accept his working role without question (1969, p. 6).

and

> Management has to realize that job satisfaction is more potent than holding down just a job, and an employee will move on if the job is not in accordance with his skills and knowledge (1969, p. 6).

The points made by Ginzberg are supported by a theory of (workers) attitudes developed by Breer and Locke of the School of Industrial and Labour Relations at Cornell University. A number of laboratory experiments supported the theory (Breer and Locke, 1965, p. 256).

The research findings can be summarized by saying that:

> In working at a certain task, occupation or trade, an individual develops certain beliefs, values and preferences specific to the task itself (Breer and Locke, 1965, p. 10).

The implication of the study is that, especially in a mobile society, there will be a lack of symmetry between the attitudes brought to a work situation and the reinforcing properties of the situation itself (Breer and Locke, 1965, p. 20).

To make allowances as much as practical for individual differences, the educational technology of today has developed the individual progress plan. It is beyond the scope of this particular study to examine this facet in detail. It has to be pointed out that this key educational problem, (and it haunts this practitioner as much as any other dedicated educator), can be dealt with in apprenticeship, that is in an on-the-job situation more readily than in the off-the-job training situation.

With a sympathetic supervisor and the one-to-one relationship between apprentice and his on-the-job instructor, who might well be called his mentor, much is possible.

This aspect is given recognition in the on-the-job training of professionals when medical doctors intern mainly on a one-to-one basis, or when school teachers follow practice teaching.

The Bemetel System recognizes the need of:

> Either matching the trainees' motivation, intelligence and other characteristics with those of the trainer, or of structuring the course to "fit" the trainees' characteristics (Ridgeway, 1971, p. 175).

This approach of closely monitoring the on-the-job training needs of the apprentice carries with it an addi-

tional important advantage. The job requirements of the individual employers are monitored at the same time and these requirements, probably different, can be taken into account.

By making the employer responsible for the on-the-job phase of the training, Bemetel obtains and maintains through the monitoring a quality control function and assures that the traditional form of apprenticeship is, with adaptions, continued.

With apprenticeship likely to continue to be an important method of training and with the lack of previous studies of the other systems, there is an indication of a need for a study of this kind into the evolving trends, especially those recognized as successful adaptions.

Summary

The search of the literature brought together information on the subject of apprenticeship training from many sources, both continental and trans-continental. Discussions centered on points especially relevant to this study.

The necessity of objectives in educational and training endeavours, whether off-the-job or on-the-job, was shown to be a definite requirement. If examinations are to be meaningful, the use of measurable objectives appears to be necessary. The applicability of written examinations to measure ability on the job was found to be open to question-

ing by Foley and the Bemetel authorities.

A major segment of the search was devoted to the organization of apprenticeship programs. The European approach gives the employers responsibility for the on-the-job training of their workers. Via industry-wide organizations a support function is provided, which encompasses stimulation, advice, supervision, and evaluative control. This promotes industry participation and provides for adaptability to changes. The quality control function assures that required training standards are attained and maintained. In the training for manpower the traditional forms of apprenticeship can be adapted to modern times by this approach, which is in agreement with the thinking and the call for active rather than passive roles in modern educational philosophy. The information obtained by the search shows that knowledge and understanding and adaptation of evolving training trends could be beneficial to local apprenticeship programs.

CHAPTER 3

APPROACH TO THE STUDY

Introduction

The search of the literature does not provide evidence that a complete in-depth study of the Alberta apprenticeship system has ever been carried out. Neither have such studies been done on apprentice training schemes in other countries, but writings on the various specific topics which are part and parcel of a trade training system are numerous. Most deal with the economic benefits of on-the-job trade training methods, but several concentrate on the evolving trends in Europe. The system developed by Bemetel in The Netherlands is frequently mentioned, since its methods have been adopted in England, Sweden and Italy and the I.L.O. is adapting the Dutch methodology to training courses they are developing for Third World countries.

A decision was made by this author to try to obtain information on the Bemetel System.

It is probable that gains can be made from an examination of an apparently successful training scheme. Extensive personal knowledge of the apprentice system in Alberta was considered an asset as was the fact that this researcher's mother tongue is the Dutch language.

Many of the findings listed below are translations from original Bemetel and associated relevant or government literature in the Dutch language.

To start the study:

1. A letter was written to the Bemetel headquarters in The Hague, Holland (see Appendix).

2. Letters were written to the Provincial Departments charged with the administration of apprentice training in the ten provinces of Canada.

3. A letter was written to the International Labour Office in Geneva, Switzerland, requesting their manual titled European Apprenticeship.

4. A letter was written to the Engineering Industry Training Board in Watford, England, requesting information on the apprenticeship programs under their direction.

5. A letter was written to the Office of Economic Cooperation and Development in Paris, France, requesting their policy paper titled Manpower Policy in The Netherlands.

6. A letter was written to the Embassy of the Kingdom of The Netherlands in Ottawa, requesting information on apprenticeship training in that country.

7. Letters were directed to a number of craft unions in both the United States of America and Canada, requesting information on union activities in apprenticeship training.

8. At a later stage of the study, similar letters were directed to the Dutch Vakverbonden (unions) associated with Bemetel programs.

9. An organized study of available library material was made. This library research covered publications on apprenticeship, and associated programs as well as material on literature dealing with the design of research, especially interview instruments.

10. A personal visit was arranged to The Netherlands, which included meetings with the Director of Bemetel and visits to job sites as well as interviews with administrators and apprentices.

Categories

The interviews were divided into four discrete categories. The four categories of questions can be grouped under the following four headings:

1. The general requirements demanded from respectively employer and employee to participate in Bemetel and/or parallel organizations.

2. The control exercised by Bemetel over employer and apprentice.

3. The curriculum and the development of training methodology by Bemetel and their implementation.

4. The monitoring of the effectiveness of the training via the Examination Board.

Results of the Enquiries

Each of the above enquiries was successful in that useful material and (indirectly) ideas were obtained.

The information derived from these enquiries, especially from the Bemetel organization, is reported, as far as practical in this study. It is obvious that enquiries covering two continents generate a great number of sources and a wealth of general information.

Under the term of practicality a large amount of information has been excluded, to keep this study practical. The emphasis has been placed on two aspects of the Bemetel system only; these are the ones that vary most from the practices on this continent and consequently offer better chances of usefulness.

These two areas are:

1. The monitoring of the on-the-job training aspects.
2. The evaluation of training results.

The fact that these two areas offer aspects of applicability to implementation in apprenticeship programs based on a system-approach as proposed for Alberta by T.W. Broad (1972), was an additional reason.

The Visit

For the purpose of gathering the primary data for this research study, the researcher visited The Netherlands dur-

ing the summer of 1973 to interview the various participants. In addition to conducting the interviews, a quantity of printed information on apprentice programs as well as on the topic of vocational education was collected.

The financial expenses of the journey were for the greater part covered by a grant from the Civil Service Association of Alberta.

The researcher carried letters of introduction from Dr. J.E. Gallagher, Chairman of the Department of Technical and Vocational Education, University of Alberta, from Dr. Karel Puffer, P.Eng., Director of Research and Academic Development, Northern Alberta Institute of Technology, and from T. Wm. Broad, President of the Civil Service Association of Alberta.

A fortunate coincidence was the presence in The Hague of Dr. H.R. Ziel.

Dr. Ziel was a speaker at the Technological Assessment Congress, which met at the same time this researcher was conducting some of the interviews. Valuable guidance regarding interviewing techniques and vital not-to-be-missed questions were only a part of the support provided.

Design of the Interview Schedule

A library research was made of resource literature to assist in the design of the research instrument as well as in formulating the questions that were to be an integral

part of the instrument.

The interview schedule in its original form was written in English and placed in the hands of the Chairman of the Department of Industrial and Vocational Education for review and criticism. This procedure was followed to determine if the questions that had been formulated were easily understood; if each question was properly phrased to fully communicate its intent to an interviewee; and if the questions of the research instrument would have to be revised before being used in the major investigation.

From this review there were minor modifications made to a number of the questions on the interview schedule.

Because the instrument was to be used with Dutch speaking participants, it was translated by the researcher into Dutch. To verify the accuracy of the translated version of the research instrument, it was given to the official translator of the Dutch Consulate General for back-translation. It was indicated that the translation was accurate. The English version of the research instrument can be found in Appendix A.

The reactions of participants to questions on the research instrument were tape-recorded, and handwritten notes also were made during each interview. The recordings that were made during the interviews were later subjected to analysis for pertinent comments related to the study. The handwritten notes also were analyzed to identify supporting comments made by the participants to questions they

responded to on the research instrument. The more significant comments that were made by the participants are included in Chapter 4.

During the on-site visits to The Netherlands to interview the people that made up the population for this study, the following cities were included: The Hague, Amsterdam, Rotterdam, Utrecht, Tilburg, and Mierlo.

Following a brief introduction to the participants, the researcher explained the objectives of the study and its purpose, and the role that the participants would have in the study. A copy of the research instrument was placed in the hands of the participant, who was then asked to read it over carefully. When the participant indicated that he had read the instrument and was ready to respond to the questions, permission was asked for the researcher to use the tape-recorder to record the responses made by the participant. This permission was readily granted in all instances.

Summary

In this chapter the procedure that was used to collect the data for this research was presented in detail.

A visit to The Netherlands was made to gather specific detailed information on the Bemetel organization. An accompanying benefit was the collection of a substantial quantity of books, pamphlets and articles on the Bemetel methodology and associated apprenticeship programs.

To supplement the bibliographical information, interviews were held in several cities with key Bemetel staff and consultants. These interviews were conducted with the aid of an interview schedule, which had been specifically prepared for the research. A tape-recorder was used as an additional aid.

The interviews were divided into four discrete categories. The four categories of questions can be grouped under the following four headings:

1. The general requirements demanded from respectively employer and employee to participate in Bemetel and/or parallel organizations.

2. The control exercised by Bemetel over employer and apprentice.

3. The curriculum and the development of training methodology by Bemetel and their implementation.

4. The monitoring of the effectiveness of the training via the Examination Board.

In the following chapter a description of the place Bemetel occupies in the Dutch trade training scheme will be presented.

CHAPTER 4

THE BEMETEL SYSTEM

Introduction

In Chapter 3 the investigative method was discussed; the results of the enquiry are now presented.

To understand the relative position of the role and activities of the Bemetel Foundation, this chapter first provides the reader with an overview of the organization of technical education in The Netherlands.

Bemetel is but one part of the total organization, if albeit one of the larger parts encompassing both the met-al and the el-ectrical industries. The other major Foundations are the SMECOMA Foundation, charged with the training for medium and small enterprises in the maintenance mechanic, refrigerating, and agricultural implement field. The VAM Foundation for the Trade Training for the Motorcar, Motorcycle and Related Business and the VEV Foundation for the promotion of training in the electronics industries, primarily radio, T.V. and telecommunications. There are 32 national organizations (Foundations) in total.

After the introduction to technical education in general, the Bemetel Foundation and its history and the reasons why it is such a major component are presented. Fin-

ally, the role of the Consultant and the Bemetel approach to Examinations is discussed.

Technical Training in General

In The Netherlands, technical (vocational) training is given both in schools and on the job-sites. It generally starts as early as age 12 or 13, at "ambachts scholen", (elementary technical schools).

The elementary technical school, generally a three-year, sometimes a four-year program, immediately followed by practical training in the workshop, falls under the category of elementary vocational training. Secondary vocational training includes what is termed a secondary technical school, usually giving a two-year course that is immediately followed by a practical year. (This course will probably be extended in the near future and become a four-year course of which one year will be devoted to practical work.) At this school the students are given training fitting them for first-line supervisory posts. Higher vocational training is given by the technical colleges, which produce technicians. The course takes four years, the third one of which is a practical year. The technician is the man who will be employed later as the head of a department, manager or in some comparable capacity. In a great many cases the graduate from a technical college is of the calibre that factory managers are made of. Finally, after the tech-

nical college come the institutes of technology, which produce scientific engineers.

In this set-up, elementary and secondary technical education may be regarded as the training of youths with a bent for practical work, whereas higher technical education and vocational technical education at university level provide training for the theorists and scientists. Although the kind of previous general education enjoyed is generally decisive for admission to a specific branch of education, the educational system is such that it is possible for a talented student to transfer from a lower form of education to a higher form. Although this will always be an exception, the "very talented" invariably constituting a very small percentage of the total population, cases do occur where the pupil goes from the primary school to an elementary technical school, passes through all the various types of school and finally graduates as an engineer from an institute of technology.

Vocational training in The Netherlands is given both at school and in the workshop. In general, the pupil who has just left the primary school is given general basic technical training at a school, which is followed by specialized trade-training in the workshop. During this practical training he also receives, partly at a day school, supplementary theoretical training.

For example, the training of carpenters and of machinists. The elementary technical school, immediately follow-

ing the primary school, generally gives a three-year course (it may be four years in some subjects). The first year takes the form of an "orientation year" in which the pupils receive partly post-primary education, partly preparatory technical education. At least two-thirds of the time is devoted to general education, but for the rest of the time the pupils are introduced to metal working, wood working, etc. During this year it is determined whether the pupil really has a technical bent, and if so, in what direction.

In the first class, then, pupils are both selected and oriented. If the pupil shows an ability for wood working, he proceeds to the general wood working class in the second year. (The pupil with a bent for metal working goes on to the general metal working class.) The curriculum in this class is half technical and half general. The technical part, however, also remains general. At the end of the second year it is decided which branch of the trade the pupil has chosen will suit him best. The wood worker, for instance, can decide whether he wants to be a carpenter or a joiner; the metal worker can decide whether he wants to become a bench-hand or a motor mechanic. Having left this school, the pupil may be employed by a firm under an apprenticeship agreement. The bench-hand, for example, may become an apprentice engine-turner in an engineering supply company; the carpenter may be apprenticed to a building contractor. To ensure proper training, the employer and the father of the minor apprentice conclude an apprentice agree-

ment under which the first party undertakes to train the apprentice properly, and the second party promises, on behalf of himself and his son that the latter will undergo the training. Such an apprentice agreement, which contains a number of obligations binding on both parties as well as other provisions concerning the training, is concluded with an industrial organization. That organization sees to it that the apprentice agreement is observed faithfully by both parties and by the apprentice.

Before entering into greater detail it has to be pointed out that the practical training given as a specialized follow-up of the program at the elementary technical school is regulated by a separate Act, the Apprenticeship Act. Although this training is regarded as a form of post-primary education, it merits separate legislation on account of its specific character. In the case of regular education, the school is the focal point, but with this type of practical training it is the firm that plays the role and, during this training, the apprentice has already begun his working life in society. Although training in the enterprise is rightly regulated by the Apprenticeship Act, the Act cannot be regarded as entirely divorced from the general Post-Primary Education Act, since the apprentice, while receiving practical training from the firm, also receives supplementary theoretical instruction at a day school. The apprentice may attend school in the evening (four evenings per week) or during the day for one day per week. Day-

school tuition in the firm's time is becoming increasingly popular since it is easier to organize and more easily absorbed.

Technical Training in the Workplace

Particularly since the War, technical training in the workplace has expanded enormously in The Netherlands. This form of training was launched diffidently in the late 1930's with about 2,000 apprentices, but has now come to occupy an important position in the Dutch educational system (in 1968 about 30,000 firms were training about 70,000 apprentices). This development is not regarded in the Dutch literature as anything out of the ordinary, for the following reasons:

1. The organization, which sees that the apprenticeship agreement is observed, is an organization constituted by industry itself, consisting of representatives of both employers and employees. The supervision of training is thus regarded by the industry as something they have willed and created themselves.

2. The organization receives a generous government subsidy but is not dominated by the Government in any way.

3. The Government's concern with vocational training differs from its concern with ordinary education. Vocational training has an important socio-economic background. Consequently, it should be firmly geared to the need and requirements of socio-economic life and adjust itself con-

tinuously not only to social developments in general, but also, and more particularly, to technical progress. It is, therefore, better for the Government to delegate this form of training to society rather than direct it itself.

4. The organization that sees to the observance of the apprenticeship agreement has not only a supervisory role but acts also in a stimulating advisory and organizational capacity. It drafts programmes, produces teaching aids and examines candidates, all in close consultation with experts from industry.

5. Every branch of industry has its own vocational training organization (as referred to under 4). The directives formulated by the organizations do not apply to any one firm, but to all the firms in that branch of industry. Its examinations are consequently recognized in the entire branch of industry.

6. The apprentice is not only a trainee, but also an employee. The apprentice is therefore engaged under a contract. This also means that the apprentice receives normal wages during training.

7. The training programmes are not syllabi in the true sense of the word. They state only the requirements which the apprentice must satisfy at the end of his training period. In other words, the goal is fixed, but the path leading to it is not.

8. Point 7 above means that the trainee may receive his instruction while engaged in and by means of the produc-

tion process. Productive work is permitted (it is indeed encouraged both for the firm's economy and to maintain the interest of the apprentice) provided it is also instructive.

9. Training is entirely on a voluntary basis. No employer is compelled to train an employee and no employee is compelled to undergo training.

10. The training organization exercises its supervision through a group of technical consultants. Each consultant has his own district with regular rounds, to the industrial workshops. These consultants, who are employed by the training organization of the industrial branch concerned, constitute a regular form of liaison between the training organization and industry. Consequently, directives are not allowed to become outdated, because the training organization is able to keep closely in touch with developments in the branch of industry concerned.

There are, of course, other reasons for the fairly rapid growth of the apprenticeship system. The general explanation is that The Netherlands was, at the end of the War, a very damaged and impoverished country. She had lost her colonial empire; the service trades, and the transit trade in particular, were paralyzed; the hard guilder had lost its value. Given the continuous increase in population, it was evident that the solution of the Dutch socio-economic problem had to be sought for the most part in the field of industrialization. This, combined with the economic growth of the European communities and almost breathtaking

technical progress, could not but place vocational training at the centre of interest.

The important position which vocational training began to assume meant that careful thought had to be given to its possibilities and limitations. It was found that the elementary technical school was not in a position to turn out fully-skilled craftsmen: the various trades and industrial skills are much too varied and specialized for that. Consequently, the school can provide no more than a general technical schooling, which must be followed by specialized training. Moreover, pedagogic-didactic standards are changing. The transfer of knowledge from teacher to pupil is no longer simply a case of the latter passively absorbing what the teacher reads out to him. The pupil must himself be active. Activity, however, presupposes interest in the subject. Particularly in the case of vocational training, this means that the subject should hold the pupil's interest and should be taught in a manner suited to the pupil's level of development. These considerations prompted a revision of education, emphasis being placed on the idea that what is new today may be antiquated tomorrow. The problem of the continuous adaptation of education has received full consideration these last 20 years, particularly in the field of vocational training.

On the other hand, the Dutch writers concede that it is quite impossible to anticipate technical progress. It is known that a few years hence the situation will be differ-

ent, but there is no knowing how it will differ. Consequently, it is impossible to train a pupil for a post which he may be required to fill in a number of years' time. The more reason, then, to give the pupil the widest possible technical background and such general education as will best enable him to adjust to the future situation.

Elementary technical schools should therefore provide a general background, but the training in the enterprise that immediately follows should be specialized and intensive. This is a further reason for the rise of systematic training in the enterprise. The flexible handling of general training requirements and the close observation of technical progress and new industrial methods have enabled the Dutch system to meet the demands of modern industry in general as well as those of the individual.

Training in the enterprise is, in fact, nothing new. Training under a master was, even in the very earliest days, the only way in which a young man could learn a trade. More than 4,000 years ago the famous Code of Hammurabi contained detailed provisions concerning the rights and obligations stemming from the master-apprentice relationship; from the time of the Roman Empire, about 2,000 years ago, we still have the complete text of an apprentice agreement concluded between a weaver and the father of a weaver-apprentice, stating the exact fines payable by the master or the father if they did not honour their obligations under the training agreement. The detailed training instructions formulated

by the Guilds in Western Europe in the 17th and 18th centuries are widely known. It is interesting to note that during the industrial developments of the 19th century, there was no room for trade training in the workshops and that this first industrial revolution gave the impulse to the establishment of independent technical schools. In the second industrial revolution which we have been experiencing since the War, on the other hand, training in the workshop has become increasingly commonplace.

Statutory Regulations

As already stated, trade training under the apprenticeship system is statutorily regulated and ranks equally with other forms of education in the Dutch educational system. This means that the Government subsidizes this form of education also. The Government (through the Minister of Education) subsidizes independent organizations set up by the industry, in which organizations of both employers and employees are represented. These organizations (in future referred to as "training organizations") use the subsidy to pay for their administration, to pay the salaries, the travelling and hotel expenses of the technical consultants they employ, and to pay for the organization of examinations, etc. Although the Government makes certain stipulations as to how the subsidy shall be spent, the Ministry of Education gives the training organizations

a free hand in determining their training policies. The training must meet certain standards as set by the Government. They are, however, general standards and there is regular and fruitful consultation between the training organization and the vocational education inspectors. However, under the supervision of the Ministry's inspectors, the training organization is free to formulate its policy in accordance with the demands made by industry. This is possible because the training organization gears its policy to the entire field covered by a particular branch of industry, which means that a trainee's usefulness will never be restricted to the particular enterprise in which he received his training.

Trade Requirements

The training organization, in consultation with experts from the branch of industry concerned, determines the requirements for every skilled trade belonging to that branch. The apprentice instructor can then train his apprentice in accordance with those requirements. As already stated, he is free to decide how his pupil shall proceed towards his goal. The instructor is assisted and advised by the training organization, which provides him with examples of workpieces for practice and arranges for regular personal visits by the technical consultant.

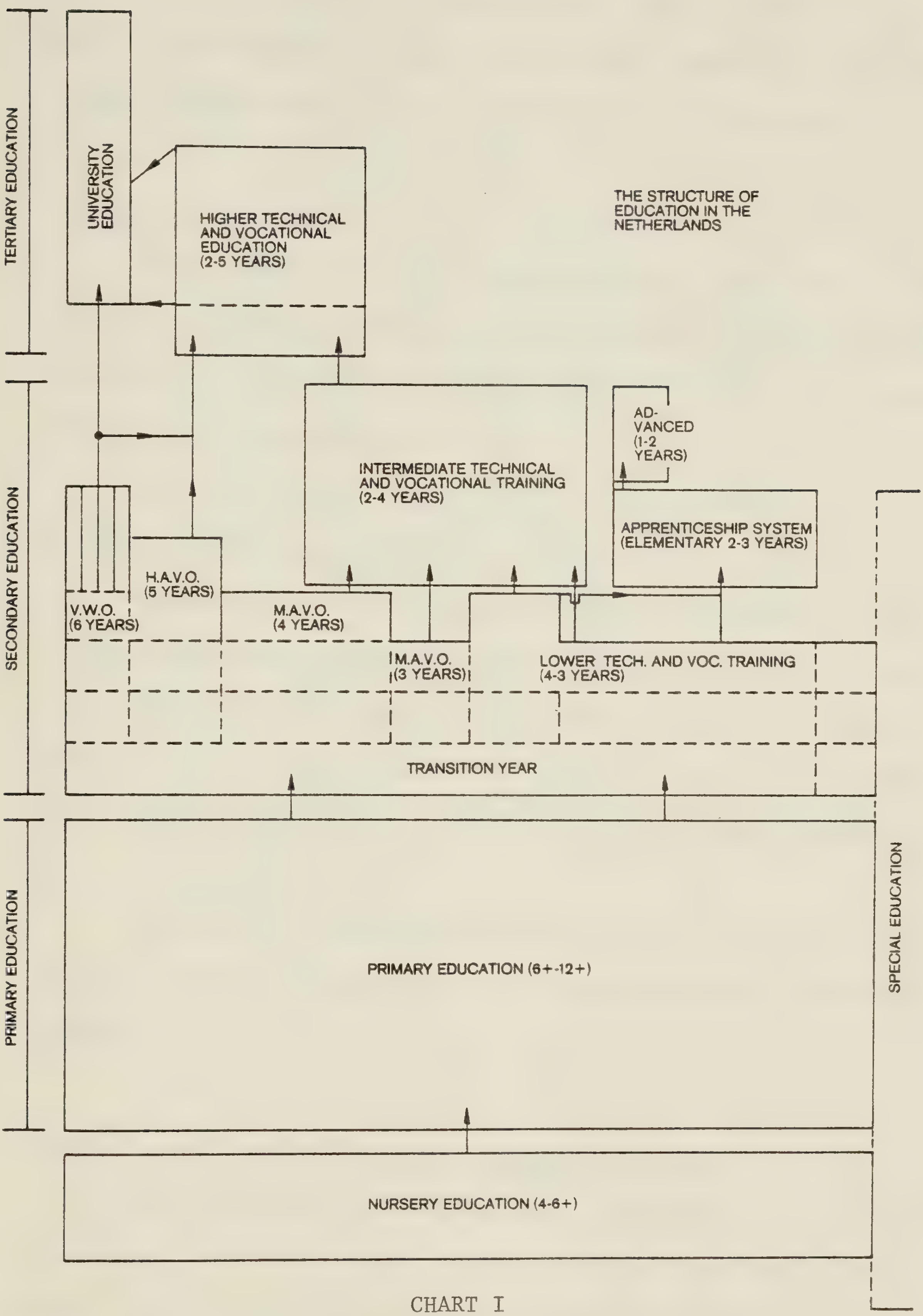

CHART I

THE STRUCTURE OF EDUCATION IN THE NETHERLANDS

Record Book

The apprentice is obliged to keep a record book from which the consultant may see what the apprentice has done since the previous visit and assess his progress.

Length of Training

The length of training depends on the trade. Two years are usually needed if the apprentice has had previous training at a technical school, and at least three years without such training.

Practice and Theory

Training in the enterprise is, in essence, practical training whereby the apprentice learns to use his hands. But practical knowledge without theoretical knowledge has little value. The modern craftsman is expected to know not only how to do a thing, but also why it should be done that way.

Therefore, under the apprenticeship agreement, the apprentice is obliged to follow complementary theoretical lessons.

General and Theoretical Vocational Training

The apprentice receives this complementary training at school, either in the evening or for one whole day a week. As already stated, training on one day in the week is preferred. At the school the apprentice is given general

education and technical-theoretical training relevant to his trade.

Examinations

At the end of his training, the apprentice has to take an examination. It is essentially a practical examination for which he has to make a workpiece. The kind of workpiece he must make is selected by a voting procedure of the examining board composed of experts from the industry and teachers appointed by the Minister of Education and Sciences from a short list submitted by the training organization. The examining board judges the examination result and advises the training organization on whether or not it should award a diploma.

The candidate is often examined also on the theory.

Diploma

Since the training requirements proposed by the training organization are approved by the Minister and since the members of the examining board are regarded as Government supervisors having been appointed by Ministerial Decree, the diploma is a legally recognized professional diploma. As the standards of both the training and the examination have been laid down nationally for the entire branch of industry, the diploma is fully recognized throughout the industry.

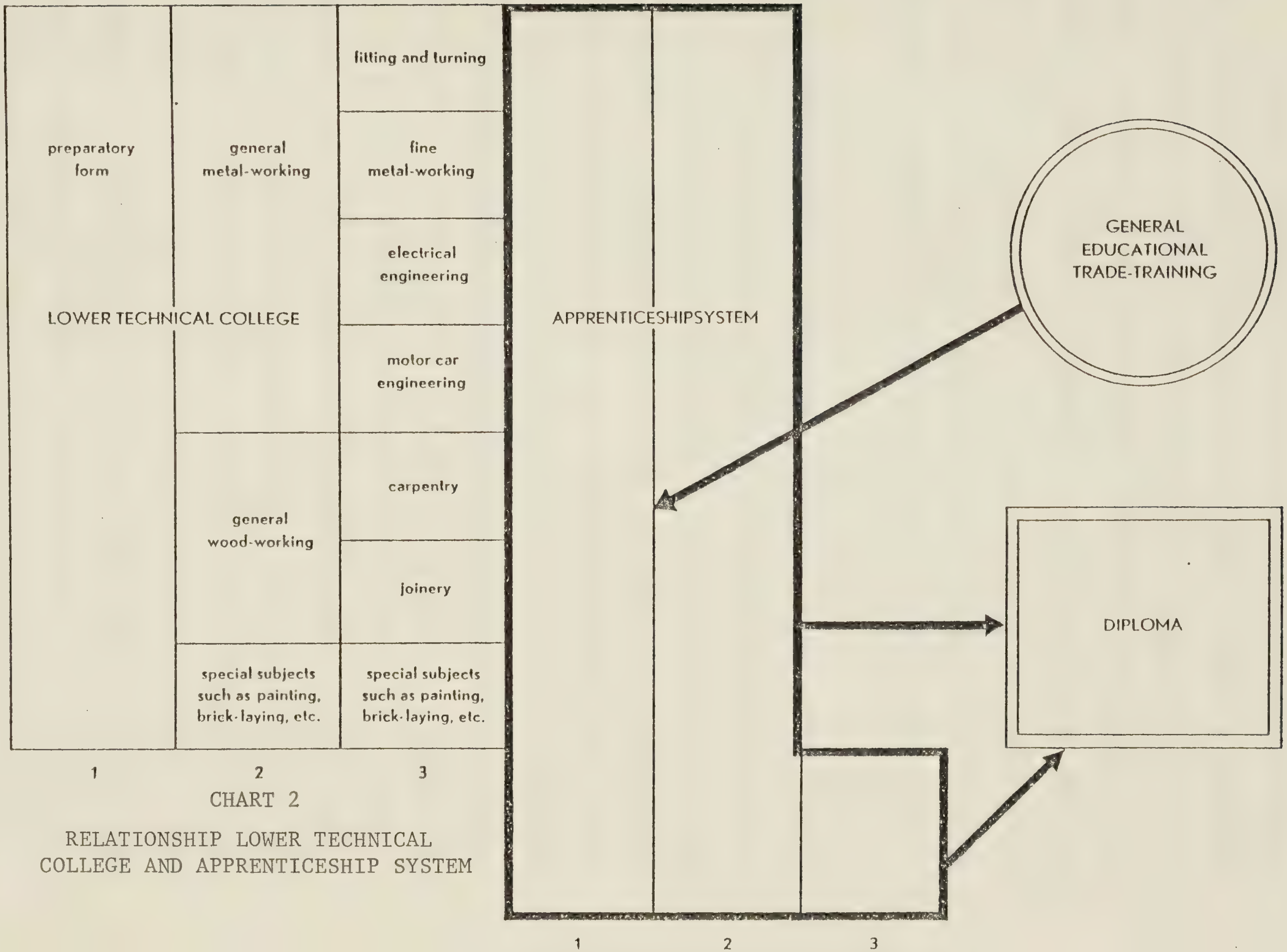

CHART 2

RELATIONSHIP LOWER TECHNICAL COLLEGE AND APPRENTICESHIP SYSTEM

Labour Relationship

There is not only an apprentice relationship between the apprentice and his master, but also a labour relationship. The provisions of the apprentice agreement and the labour agreement must never be in conflict. The fact that there is also a labour agreement has the advantage that the apprentice receives wages. This encourages the apprentice to accept training. A young employee is less likely to be exploited, since his training is under constant control.

Cost of Training

The Government subsidizes the training organization. The subsidy does not always cover all the expenses incurred by the training organization. Any expenditure that is not covered by the subsidy must be borne by the industry itself.

In The Netherlands any enterprise providing training facilities receives an allowance towards the cost of training from the training organization. The training organization in turn is entitled to enter such allowances in the estimates which it presents to the Government as an item qualifying for subsidy. Consequently, the Minister has laid down a fixed amount per apprentice per annum for that allowance, plus a premium for each examination passed. The allowance is only a fraction of what the training costs the industry although no figures are available. In many cases, the allowances are repayed, either wholly or in part, to the training organization to defray any extra expenses it

may have. The refund is an insignificant loss for the firm, but to the training organization the total of such refunds represents an important source of income.

What it actually costs an enterprise to train an apprentice is impossible to ascertain. Under the Dutch system, the apprentice is an ordinary wage-earner and he is even productively engaged if such is compatible with his training. So the expense of the apprentice to the firm is partly recouped by the firm through the apprentice's work. Although the cost of training is much higher than the immediate benefit, the long-term advantages to the firm of a well-trained craftsman will more than compensate the initial loss.

An important point is, whether professional training is too expensive, and can only be a matter for the larger concerns. Within fixed general lines, however, the Dutch system is flexible. Since strict chronological training programmes do not have to be followed the training can be adapted to suit the character of the individual enterprise. One firm, for instance, will arrange for its training to be given in a separate schoolhouse: another firm will have it given in a partitioned corner of the workshop, and in a third firm the young man will receive his training in the workshop itself. In fact, a separate workshop for training is not even regarded as preferable. The aim of training is not exclusively to teach the apprentice to use the tools of his craft, but in the first place to prepare him for his eventual function as a craftsman. The Dutch are of the

opinion that the closer one comes to reproducing a normal working atmosphere, the better the results of the training will be. In this way, industrial training constitutes a flexible link between school and employment. It is obvious - and Bemetel claims that the experience in The Netherlands has confirmed this repeatedly - that any firm, however small it may be, is capable of training a young man to become a fully skilled craftsman.

Training under the apprenticeship system may be given by all types of firms. In The Netherlands this method of professional training is used in about 30 different branches. It is, however, beyond the scope of this paper to discuss the entire list of existing training facilities. Although the basic principle underlying all these training courses is the same, the way in which they are carried out varies from one to the next. The training of an apprentice butcher in a butcher's shop will obviously differ in character from that of an apprentice welder in a shipyard; the training of a skilled operator in the chemical industry must subject to other standards than the training of an apprentice seamstress in a ready-made-clothing factory. All these training courses are nevertheless based on the same principle. The young workers receive wages and are productive during their training period. The instructional content of the work is guaranteed by the system of regular information and control.

The Dutch authorities feel that training of this kind

may be given anywhere and by anybody, provided the employer has the right attitude: he should not only be able to provide training, but he should also have a positive wish to do so. If he has that mentality he will no doubt see his way to adapting the interests of his own business to the interests of the trainee - and vice versa.

The Bemetel Foundation

Introduction

It is essential that the activities of the Bemetel Foundation be pictured against the background of the conditions prevalent in The Netherlands at the end of the Second World War. The traditional association with the Dutch East Indies was radically altered and subsequently completely severed. Jobs had to be found for demobilized soldiers and additionally for the thousands of people returning from Indonesia, concentration camps and prison camps. The position was further complicated by a rapid natural population increase in an already densely populated country.

The only solution was to industrialize.

Today, The Netherlands has not only made good the War damage that it suffered, but has established an expanding industrial economy. There is, in some European countries, such as Germany and Switzerland, an uninterrupted tradition of apprenticeship dating from the Middle Ages. Systematic apprentice training had its golden days in the

times of the guilds but, in many countries, apprenticeship in this form was broken up in the 18th century when the activities of the guilds stopped, owing to the influence of the French revolution. This fact has had its advantages as well as its disadvantages. In the countries where the tradition was unbroken, apprenticeship is a normal thing, whereas in other countries the management of companies had to be convinced that the training of young people in their own workshop is part of their responsibility and is in the interest of the apprentices as well as in that of the company. On the other hand, those countries where apprentice training as a well organized system had vanished, could start from the beginning with a new system designed to meet the new situation.

Since the Second World War in particular, one can speak about a revival of systematic apprentice training. In many countries the economic and social circumstances have changed fundamentally. In The Netherlands, for instance, it proved necessary to industrialize a country which before the War could mainly be considered as agricultural. Not only had the economic and technical situation to be changed, but Dutch youth had to be convinced of the importance of technical occupations. One of the advantages in The Netherlands was the extremely close cooperation between employers' organizations and trade unions. This was built up secretly during the War, when the occupation authorities prohibited the activities of the trade unions, and the

employers dissolved their own organization from a sense of solidarity.

Post Second World War System

Directly after the War, the so-called Foundation of Labour, secretly prepared during the occupation, came into the open.

It was the executive section of this organization, which was specifically responsible for the social aspects of economic life in The Netherlands, which decided in 1945 that each branch of industry ought to have its own organization for the promotion, development and application of apprentice training. During the period 1945 to 1961 central training organizations of this kind have been developed in practically all branches of industry, e.g., printing, engineering, textiles, the chemical industry, the building trades and others. These training organizations cooperate in a central training association. It is a characteristic feature of these organizations that employers and trade unions are represented on their boards. Because of this bipartite representation the common interests of employers and workers are expressed and in The Netherlands we can say that there is no essential difference of opinion in the matter of training and apprenticeship between the two groups.

As early as 1938 the general employers' organizations in the metal and electrotechnical industry had taken the initiative to create an association for vocational training.

This association was transformed in 1945 according to the new plans; its new name was - by abbreviation - Bemetel. To avoid all misunderstanding it must be mentioned that the Dutch expression "metaal- en electrotechnische industrie" includes engineering, electrical engineering, shipbuilding, steel manufacture, foundries, the aircraft and motor car industry.

Financial Assistance

Another characteristic feature of the situation in The Netherlands is that the Ministry of Education and Sciences is empowered by a new Law on Apprentice Training passed by Parliament in 1967, to delegate the direct control of apprenticeship to industry's own organizations and substantial financial help is given to the training organizations set up in each branch of industry as well as to the companies where apprentices are trained.

The Ministry pays the operating costs of the central training organizations insofar as they occupy themselves with apprentice training in the strict sense of the word. This includes, for example, salaries and travelling expenses of Bemetel's training officers and staff and the costs of examinations, but excludes all special courses, the design of teaching media, etc.

The same law empowers the Ministry to pay to each firm 60 guilders per annum for each apprentice.

These subsidies to the individual firms are paid by

the Ministry of Education and Sciences via Bemetel. Although Bemetel is responsible to the Ministry of Education and Sciences for the way in which this finanical help is used, it must be emphasized that the Ministry is not represented on its board. During the interviews it became apparent that the cooperation between Bemetel and the representatives of the government can be said to be most effective and cordial.

The general attitude in The Netherlands is that it is efficient to invest government subsidies in central organizations for each branch of industry which can give expert advice and technical help to their affiliated member-companies.

Indentures

The legal basis for apprenticeship is a written contract between the employer and the apprentice or his legal representative.

In the Dutch metal and electrotechnical industry the contracts (indentures) are countersigned by Bemetel. By countersigning the indentures Bemetel accepts the responsibility to see that both parties keep to the regulations of the contract.

The first task of Bemetel is to set up standard trade requirements for each trade for which apprentices are trained. Experts from industry at various levels (craftsmen, foremen, engineers) give advice to Bemetel on all

details of these trade requirements.

All companies taking part in the training of apprentices have to bring their apprentices to that standard, regardless of the firm's size or position. It must be emphasized that these trade requirements are not to be considered as "programmes" because the Dutch attitude to this question is that the training of apprentices has to be adapted to the particular situation in each industry. It is recommended that as much production work as possible should be introduced on condition that this work fits into the firm's individual training scheme and brings the apprentice to the level stated in the trade requirements.

A few years after the end of the Second World War Bemetel decided also to accept as members other firms and institutions, not belonging to the metal and electrotechnical industry, as long as they employ skilled metal workers, e.g., for maintenance and repair, and as long as they are able and willing to train apprentices.

Therefore textile companies, oil companies, clothing manufacturers, paper mills and also the Royal Navy, the Army, the Air Force, K.L.M., The Netherlands Railways, university and hospital laboratories, and many others are among Bemetel's members.

Duration of Apprenticeship

The duration of an apprenticeship varies according to the previous education and the "difficulty" of the trade

chosen by the apprentices.

In the metal and electrotechnical industry the training of an apprentice-turner takes two years if he has followed a junior technical school course, three years if he has not. The training of a toolmaker takes three years for apprentices from junior technical schools and four years for others. According to law all apprentices have to attend technical schools, either in the evening or one day per week. The part-time system is growing rapidly. The wages during this day are normally paid by the employer.

At the evening as well as at the part-time schools the curriculum includes technical and theoretical subjects as well as general education. Normally all practical training is done in and by the company.

Relationship Between Industry and Technical Schools

Bemetel was able to play a role in bridging the gap between the Dutch technical schools and industry. The following paragraph summarizes a not-unknown scenario and the Bemetel interviewee's opinions of what they are striving for.

Technical school teachers, who sometimes think that they have a monopoly as pedagogues, must be convinced that industry too has its own training experts. On the other hand industry must be convinced that it is not true that these teachers are nothing but "out-of-date school masters". It is of great importance that emphasis is laid on both the

training of technical school teachers and instructors in industry.

Teaching Media

Bemetel's experience has indicated that another task is to design and make available various teaching media.

The most important ones are complete manuals for various trades. In 1964 these manuals consisting of a series of drawings of workpieces indicating work methods, operational sequence, solutions of difficulties and marking sheets, were available for fitting, turning, sheetmetal and fabrication work, welding and grinding.

In producing these manuals, which consist of approximately 36 exercises each, gradually increasing in difficulty and complexity, it has been the intention of Bemetel to create a methodical system of training.

With the aid of experts in the specific field, a correct method of producing the workpieces is given.

The important details in the various stages of manufacture are outlined and, wherever necessary, illustrated. The operational sequence given is not the only method of manufacturing the workpiece and therefore the manuals are to be considered as suggestions for the instructor, not as a compulsory course.

It is recommended that the apprentice makes test pieces regularly during the training period. This can be a production item as produced by his company, requiring a

similar standard of skill to that of the corresponding Bemetel test piece. It need not necessarily be one of the workpieces from the manual.

It is important that, first of all, an operational sequence or order of work is made by the apprentice which, after checking by his instructor to ensure that he understands the correct method of working, will serve as a directive in manufacturing the workpiece.

In order to allow for an evaluation of the completed workpiece, each exercise of the manual is provided with a marking sheet.

Three of these manuals, on bench-fitting, turning and universal grinding have been translated into English. Bemetel cooperates with a publishing firm in the production of text books for technical schools. These books deal with engineering, shipbuilding and many other subjects.

A recent activity is the design and production of transparencies for the overhead projector. Series on measuring, micrometer reading, developing and turning (the latter in cooperation with the Royal Dutch Navy) have been produced.

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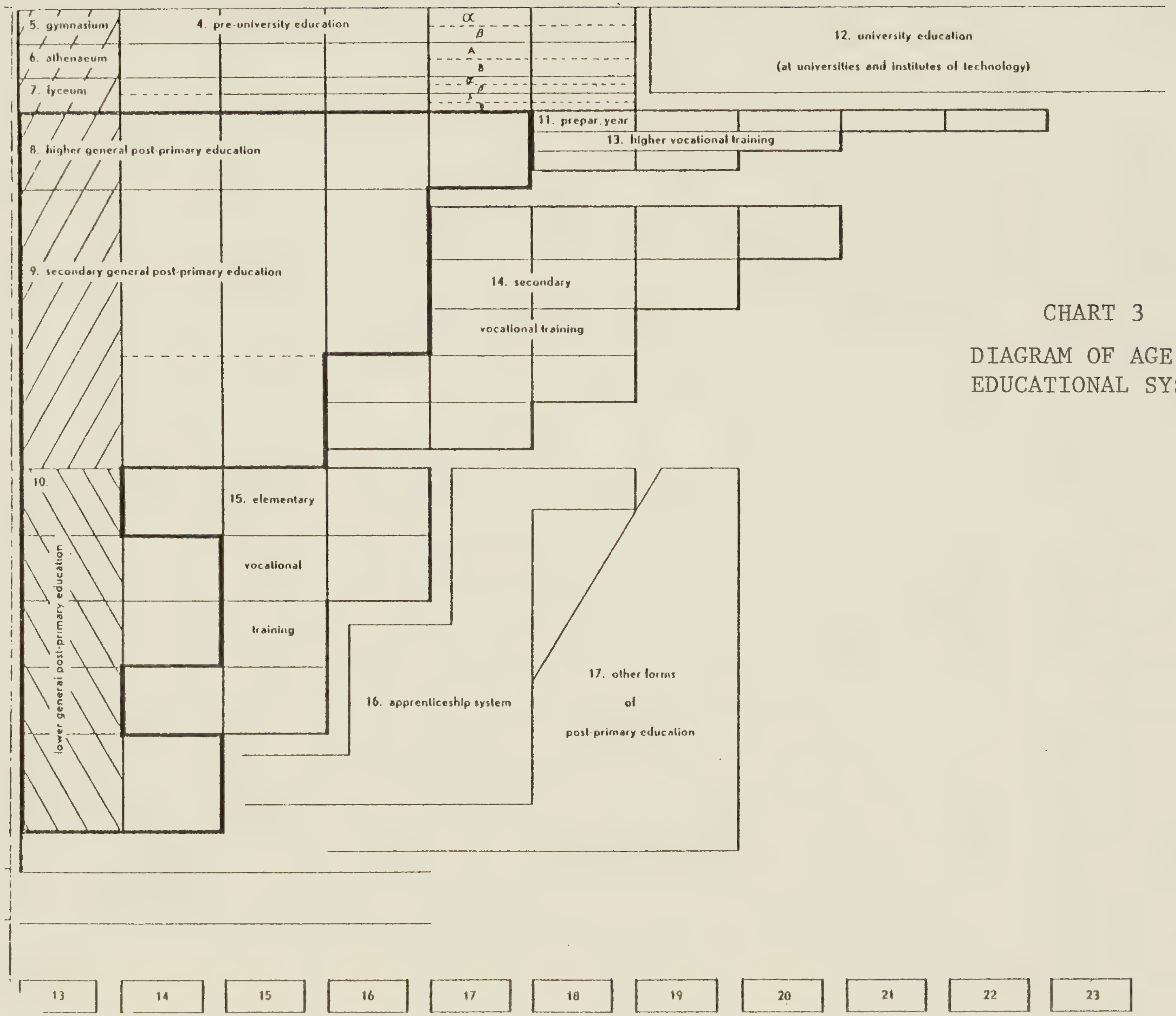
* A new and very interesting undertaking is the "apprentice-village". Under the guidance of several Foundations in close cooperation with the participating companies and trade unions, apprentices, pretty well by themselves, create and build rehabilitation cum holdiay resorts. These villages or camp-style resorts are located in sanatorium-like, quiet, clean-air, lake or forest areas. They are used by members of the participating groups for recuperative or therapeutic sojourns. Typical uses are immediate pre- or post-natal care for both mother and infant, extended day care for children when parent(s) are hospitalized or as a locale where injured workers can recuperate or be rehabilitated.

CHART 3

DIAGRAM OF AGE AND
EDUCATIONAL SYSTEM



The Consultants or Training Officers

Bemetel employs 55 full-time technical training officers. It is their task to see that companies comply with the standard trade requirements, to collect experience and to advise and assist in the maintenance of correct training standards.

One of the main advantages of this system is that Bemetel, through the medium of its training officers, can coordinate the interchange of training experience, practices, concepts and ideas among its member companies.

It is important that these training officers are considered by industry as experts, employed by its own organization and not as government officials exercising a controlling function. Bemetel training officers are all specialized in a trade or group of trades. There are three chief training officers, seven group training officers for general engineering with 20 training officers, one group training officer for shipbuilding with 12 training officers, one group training officer for fine mechanical trades with six training officers and one group training officer with three training officers for foundry trades and specialized training officers for the training of gold and silversmiths, for measuring and regulation technique and for "orthopedic instrument-making".

Another extremely important task of the training officers is assisting individual firms to set up and main-

tain training programmes according to the individual requirements of that particular company.

It must be clearly understood that under Bemetel it is not the training organization but the particular enterprise that provides the training. It is the employee (respective instructor) assigned by the firm to teach the apprentice who gives the training: the consultant from the training organization observes how he does it, in other words the consultant provides the quality control.

In many other countries excellent courses are organized to train trade instructors for their job. Bemetel also provides such courses, but they are still in the experimental stage. This is mainly due to the fact that there does not seem to be such an evident need for on-the-job instructors in The Netherlands, where the consultant is able to rectify any shortcomings the instructor or the journeyman acting as instructor may have.

The consultant is generally a technician of secondary technical level, with several years' industrial experience. He is often qualified as a technical teacher and holds a teaching certificate. He forms a link between the training organization and the individual firm, and through his colleagues between the various firms. He has a stimulating, organizing, advisory and supervisory task as outlined in detail below.

Coordination

The control exercised by the constultant is the key to the proper functioning of the Dutch system.

Since such a position is unknown in Alberta a more detailed description is necessary to understand his work. The functions of the consultant are summarized from the job description and show that a classification of the tasks is possible under nine general headings.

1. Information and Stimulation. Informs and stimulates the appropriate persons, organizations, and factories as regards the apprenticeship scheme. Sets out what is understood by trade training under the apprenticeship system and more especially publicizes the aims and methods of the Training Organizations.

2. Organization. Where sufficient interest is shown, arranges the drawing up of contracts, talks with the employers or their representatives, with local committees, regional committees, labour exchanges (e.g., about the number of available pupils and their placement), technical schools (e.g., about general and vocational instruction), local employers and workers organizations etc.

3. Administration. It is clear in 1 and 2, but especially in the drawing up and signing of contracts, that administration is an essential part of the consultant's job.

4. Instruction. The consultant will certainly have to teach the instructors the best training methods. Concerns do arise as to whether the consultant does not also

have a responsibility as regards the instruction of the pupils themselves.

5. Collection of Data. One of the most important aims of the Training Organizations is to ensure that the training in each branch of industrial activity progresses as smoothly as possible. It is clear, then, that experience gained in practice must be made available as far as possible to the whole branch. The consultant, who daily visits factories in the organizations, is naturally the man to collect all relevant data and to pass them on to his training organization.

6. Advice. In order to make such data on trade-training as widely known as possible, the consultant will pass on this information after its approval by his training organization to the other factories in his area.

7. Supervision. Supervision is not the only important part of a consultant's job, but it must receive its due share of attention. The consultant must satisfy himself that the conditions of the contract are being adhered to. Moreover, it is the task of the training organization to see that the grants are being used in a proper manner. The training organization entrusts this work to the consultant.

8. Planning. The consultant is becoming more and more involved in drawing up lists of teaching aids required, planning courses and setting examination papers.

9. Examinations. The preparation of examinations is an integral part of the work of the training organizations,

a large part of which is the consultant's responsibility.

Given the many activities of the consultant and the many different branches of industry and trade concerned, it is obviously very difficult to give a picture which is applicable to all organizations active in this field. The extent, for example, to which the consultants are connected with administration, instruction and examinations may vary from one training organization to another. It is, however, true to say that the consultant is concerned in varying degrees with the nine above-mentioned points.

Two of the above points - namely the instruction side of the consultant's work and the specialization of consultants in special trades - are very important.

Instructing

As stated, it is the consultant's task to instruct, where necessary, the apprentice-instructors in the correct teaching methods.

Recently the question has also arisen in several training organizations whether the job of instruction can be extended to include individual and group instruction of the apprentices.

In attempting to answer this question it must be borne in mind that the direct training of the apprentices is undoubtedly the primary task of the factories, and this means that the latter are expected to see that their apprentice-instructors are, and remain, capable of performing this work,

with the help, where necessary, of the training organization.

It sometimes happens, that the training programme demands that the apprentice becomes proficient in certain skills for the practice of which the factories have no facilities. In such cases the consultant can take over this work - although, in fact, it is the responsibility of the factories concerned - especially where this part of the practical training cannot be made part of the general and occupational training given at the technical schools. In some cases it may also happen that the instructor falls short of the standards required. In such cases, when it is impossible or not yet possible to remedy this deficiency on the part of the instructor, the consultant may find it necessary to take over the instruction of the apprentices himself. If this is the case, it must be done only after consultation with the factory and the instructor, and in such a manner that the prestige of the latter is not prejudiced. Moreover, the apprentice-instructor should be involved as far as possible in the instruction so that he can assume responsibility for it as soon as possible.

Finally, it is known that in certain groups of factories, technical development is very rapid, and every effort must be made to introduce these developments during the course of training. Here, too, the consultant can offer a helping hand, needless to say, only under the same conditions as mentioned in the last paragraph.

In connection with the above it should be noted that,

especially in the case of trade training for which the technical schools have no expert instructor, the school authorities may approach the training organization with the request that a consultant give several lessons per week. There is no objection to this happening in special cases.

Specialization

In the training organizations for branches of trade and industry involving several different crafts, it is impossible for every consultant to have the detailed knowledge needed to exercise proper supervision over all the training under the jurisdiction of the organization. In such cases, it is necessary that specialist consultants be available. It is not necessary that complete control always be put in the hands of the specialist consultant. When the craft or crafts for which a specialist consultant is required are not very different from the "normal" trades, then the work can be carried out by the "normal" consultant, with the specialist consultant carrying out checks at regular intervals.

It sometimes happens that the craft or crafts belong to a certain branch of industry or trade but differ to such an extent from "normal" crafts that supervision must be undertaken by a specialist.

This question will arise only in certain branches. It must be borne in mind, however, that in certain cases only the specialist consultant will have the necessary know-

ledge to see that the training is carried out properly and to judge whether the training is of the standard required.

Consultants' Functions

In the following section a list of consultant functions are given.

1. Information and Stimulation.
2. Organization.
3. Administration.
4. Instruction.
5. Collection of Data.
6. Advice.
7. Supervision.
8. Planning.
9. Examinations.

For every function dealt with there are a number of necessary contacts and activities required of the consultants.

The contacts are listed in the left hand column, the required activities are listed in the right hand column.

Description	Activities
1. Information and Stimulation	
Contact with:	
- own training organization	- individual talks
- employers and workers organizations	- group discussions
- labour exchanges	- correspondence
- local career guidance offices	- lectures
- parents and schools	

Description	Activities
2. <u>Organization</u>	
Contact with:	
- local employers and workers - organizations - labour exchanges - heads and teachers of technical schools - apprentice-instructors - local committees	- individual talks - group discussions - correspondence - conduct discussions - draft and edit proposals - draw up programmes - act as secretary at discussions and on examination committees
3. <u>Administration</u>	
Contact with:	
- own training organization - technical schools - works and factories - local organizations - parents	- correspondence - preparation of contracts - organization of examinations - systematic processing of information - draw up reports
4. <u>Instruction</u>	
Contact with:	
a. apprentices	a. in connection with apprentices: 1. individual instruction 2. specialized instruction to groups 3. assess work done and conscientiousness
b. apprentice-instructors	b. in connection with instructors: 1. individual discussion with apprentice-instructors 2. group discussions with apprentice-instructors 3. draw up reports 4. organize and lead excursions

Description	Activities
5. Collection of Data	
Contact with:	
- own training organization	- individual discussions
- specialists from production departments of factories	- draw up reports and conclusions
- apprentice-instructors	- organize and lead excursions
- school teachers	- correspondence
- colleagues	- act as secretary at discussions
- trade institutions	
- read trade literature	
6. Advice	
Contact with:	
- fellow consultants	- individual discussions
- apprentice-instructors	- group discussions
- school teachers	- draw up reports and conclusions
- trade specialists	- conduct discussions
- publishers	- correspondence
- tool manufacturers	- dissemination of information
7. Supervision	
Contact with:	
- works and factories	- individual discussions
- apprentice-instructors	- group discussions
- apprentices	- correspondence
- local organizations	
- parents	
- own training organization	
8. Planning	
Contact with:	
- technical experts	- establish list of appliances, books, etc.
- colleagues	- test pieces, examination papers, etc.
- own training organization	- draft and edit proposals
- technical schools	

Description	Activities
9. Examinations	
Contact with:	
- apprentices	- design test pieces
- apprentice-instructors	- organize marking
- markers	- write theoretical examinations
- government officials	- staffing
	- evaluation

Qualities

Listed below are the qualities required in a consultant undertaking the functions, contacts and activities given in the previous section. They can be divided into, on the one hand, personal qualities and on the other, proficiency, knowledge, skill, etc.

Many of the proficiencies mentioned can only be acquired if certain other qualities are already present, it may be possible, to develop these qualities by study and practice.

Among These Qualities Are:

- tact
- persuasiveness
- inventiveness
- reliability, trustworthiness
- accuracy
- discipline and team spirit
- pedagogic acumen
- technical interest
- organizational ability

<u>Among the Various Proficiencies Are</u>:

- practical and theoretical trade ability (university degree not necessary, but equivalent of Technical College training is required)
- good draughtsmanship
- practical trade experience
- some practical experience in leadership
- efficient organization of activities
- logical and systematic processing of data
- knowledge of hierarchical structure of own organization
- objective judgment of work
- knowledge of the use of visual aids in training
- knowledge of relationships in general training and especially in technical training
- knowledge of relationships in trade and industry and in the trade and industry organizations
- knowledge of relationships within the concerns he visits
- knowledge of the social and economic structure of his own sector
- trade and industrial economic insight
- sufficient knowledge of languages to understand technical articles in foreign trade magazines, etc.
- good social manner
- general knowledge
- good knowledge of Dutch, both oral and written
- reasonable ability to make speeches, give lectures, etc.

Of the above-mentioned points (apart from practical and theoretical professional knowledge), tact and a good social manner are vitally important; the other points are not listed in order of importance.

Most of the trade organizations employ approximately one consultant for every 200 apprentices. They are assisted by office personnel - to handle the paperwork - at a ratio of one staff member per 300 apprentices.

The Director of Bemetel indicated that they had no great recruiting difficulty, but what was astonishing to this researcher was the relevation that the turnover was, by normal personnel standards, enormous. At least 25 percent

of the consultants quit each year and some years the figure amounted to one-third of the staff complement. Bemetel considered this a natural and not undesirable feature. It was explained that with the intense involvement in newly developing trends, the wide acquaintance with the industry and the general high ability present among the training officers, they made very sought-after managerial staff for the very enterprises regularly on their itinerary. The longest time any one consultant generally remained with Bemetel was around four years. By this time the young technician had generally done enough travelling from company to company, week in week out, that he was ready to settle down and "commence a family life". The great amount of moving around had enabled the training officer to decide which part of the country was attractive to settle down in and which company was most compatible with his personal outlook on his skills and desired lifestyle.

Since it was traditional after World War II that many secondary-level Dutch technicians looked to emigration as the often best, if not only, option to obtain rewarding employment, it is understandable that the career of consultant was an attractive option for young technicians. The Director pointed out that with a good pool to choose from and the challenging nature of the tasks on hand, a high level of enthusiasm was a common feature among the beginning consultants. It was mentioned additionally that the companies, due to their very own interest, participation in and concern

for the Foundation arranged the separation, respectively starting dates in consultation with the Headquarters in The Hague. The general impression was that the use of consultants was a vital and well performing aspect of the Bemetel operation. To a final query whether he thought the scheme would work equally well in Canada, the Director's answer was: "Yes, if you trust them."

Qualifying Examinations

In the Bemetel system all apprentices finishing their training period have to make exactly the same examination testpiece in exactly the same week from exactly the same blueprints provided by the central training organization. Afterwards all these testpieces are brought together at the same place, where they are assessed and measured by the same experts from industry according to identical rules. Besides that the candidates have to answer in writing a number of questions on the theory of their trade and they have to do blueprint reading exercises. Bemetel claims the following advantages for their method:

1. The national standard is maintained.

2. Each industrial undertaking has the opportunity to make a comparison between its own results and the national average.

3. Regional or local shortcomings and deficiencies will show up and can be discussed with the school or indus-

trial undertaking in question.

4. General shortcomings and deficiencies may be revealed and appropriate measures may be taken to avoid them, for instance in the form of extension courses or additional equipment.

An added advantage which has proved very significant is that when the thousands of workpieces are inspected and evaluated at one Centre, the 300 or more industrial experts who do this for a period of approximately two weeks have an excellent opportunity to compare notes, and exchange views and ideas.

The important part of this evaluation of workpieces is that the old conventional system of evaluating them as a whole, one after the other has been abandoned. The method which has been used for many years already works as follows; an elaborate analysis is made of each individual specimen and each detail of the evaluation is determined. A turning job for instance that took some 40 hours of work is checked for 91 details. For the evaluation proper the same dimensions are checked on each workpiece. For example, if the diameter of a hole of a turning job has to be measured, the hole diameters of all specimens - often many hundreds - are measured one after the other and the results are noted. The advantage of this method is that it allows the assessors continuous use of the particular control gauge thus making for more accurate inspection.

The points to be evaluated are for most trades broken

down into the following categories (the example given here is for a turning job):

1. Dimensional accuracy.
2. Setting out.
3. Grade of fit.
4. Surface finish.
5. Profiles, tapers and centres.
6. Finish of threads.

As for the dimension accuracy, i.e., in case of measurable quantities, the rule is that there are only two possibilities: inside or outside the tolerance, or, in other words, correct or incorrect so that there is no such thing as "almost correct".

Consequently, the candidate gets the fixed number of marks or nothing at all. For the other evaluations the following marks are given:

3 = excellent; 2 = good; 1 = not good; 0 = poor.

This method was selected after elaborate experimenting since actual practice proved that a grading system between 1 and 10 allows according to Bemetel for biased appraisals.

For some details which the examining board considers of primary importance for the skill of the candidate a multiplication factor of two or three is applied. The following method of assessment outlines the manner of awarding a total number of points to the workpiece together with

its final evaluation. This final evaluation is a comparison in terms of points with the valuation of an ideal workpiece is set at "nine"; workpieces with a lower total of marks are awarded a proportion of that figure. For example:

Maximum points obtainable	= 389
Points obtained by candidate	= 287
Quality mark obtained	= $\frac{287}{389} \times 9 = 6.64$

In addition to the quality of the workpiece, the time taken for its completion is also taken into consideration. The examining board determines a set time for the workpiece but the time evaluation is based on the "finishing time" or the average time, which is the sum of the total time spent by all the candidates on the workpiece divided by the number of candidates. If the time worked by an individual candidate is higher than the "finishing" or average time, then a deduction of one point is made for each 30 percent in excess and pro rata. For example:

Set time	=	48 hours
Finishing or average time	=	50 hours
Time worked by candidate	=	52 hours
Excessive time taken	=	52 - 50 = 2 hours
30% of 50 hours	=	15 hours
15 hours excess time	=	1 point deduction
2 hours excess time	=	$\frac{2}{15} \times 1 = 0.13$ point deduction

For completion of the workpiece in a shorter time than the set time, a gain of marks is awarded on a graduated scale which penalizes fast but slipshod work.

Quality mark between 8 and 9 - 20% shorter working = +1 point

Quality mark between 7 and 8 - 30% shorter working = +1 point

Quality mark between 6 and 7 - 40% shorter working = +1 point

When the quality mark is lower than six, no additional marks can be awarded for shorter working.

By deducting the time corrections from, or adding them to the provisional mark, the workpiece mark is obtained; it is calculated correct to the second decimal place and rounded off to obtain the final mark. Finally, the result of the examination is determine by considering this final mark as well as the marks obtained for other subjects such as theory, reading of drawings, vocational and professional knowledge, etc.

Although in some cases the nature of a given trade calls for a different system of evaluation and appraisal, the above gives a general idea of the technique underlying the system used by Bemetel. This system of examining the level of craftsmanship at the end of apprenticeship seems to draw much attention from other countries.

In recent years Bemetel has had participants from Great Britain, Sweden and Italy. In some cases the intention has been to find out how examinations could be organized in countries where systematic apprenticeship is in progress;

in other cases in order to compare results and methods.

Bemetel's publication states:

> Whatever the intention was, the discussions on an international level proved to be extremely useful, at least to Bemetel, but probably to both parties. (Bemetel, n.d., p. 32).

Summary

The need of the (industrialized) nations of the world for skilled manpower has created an interest in manpower development programs. The demand for possession of technical knowledge and the (manipulative) skill to apply that knowledge intelligently on the job have correspondingly given a revival of "apprenticeship". In The Netherlands this development is not regarded as anything out of the ordinary, and technical training has been geared to the needs and requirements of socio-economic life and to technical progress. The government has delegated this form of training to "Stichtingen", rather than direct it itself. One of these "Stichtingen" or Foundations is Bemetel. A Foundation has not only a supervisory role but acts also in a stimulating advisory, organizational and quality-control capacity. It develops curricula, produces educational materials and examines candidates. The Foundation or training organization exercises its supervision through a group of technical consultants or training officers. Each consultant visits the workshops regularly, and so provides a continuous form of liaison between the training organization

and industry. By coupling training in the workshop to production, due allowance can be made for technical progress. Each consultant supervises the training of, on the average, 200 apprentices. The turnover among consultants, who are drawn from the ranks of technicians or technologists, is high by educational standards, but the supply is adequate to meet the need.

The preparation of examinations is an integral part of the work and responsibility of the consultants. The emphasis in the examinations is on a testpiece. The examination workpieces of apprentices are executed in their own workshop, but judged centrally. At the marking centre about 350 experts thoroughly inspect the examination pieces of the 5,000 candidates. The method of evaluating a workpiece as a whole has been abandoned; instead, an elaborate analysis is made of each individual specimen and each detail of the evaluation is accurately determined. The rule is that there are only two possibilities: correct or incorrect. Consequently, the candidate gets the fixed number of marks or nothing at all. This method was selected after elaborate experimenting, since actual practice proved that a grading system between 1 and 10 makes for biased appraisals.

The Bemetel system of evaluation is receiving attention from other countries.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

In this chapter a summary of the preceding chapters is presented with a restatement of the purpose and significance of the project. Some implications are also reported as are recommendations for further study.

Background of the Study

From library research on the topic of apprenticeship training in general and in The Netherlands in particular, it was found that little information on the subject was available in any of the libraries at the universities in Alberta. T.W. Broad in his Master's Thesis had recommended that a descriptive study be undertaken of especially the Bemetel approach in The Netherlands, since it appeared to have several interesting facets.

Considering this lack of information, it was felt that a descriptive study of apprenticeship training in The Netherlands and the methodology of the Bemetel system of training could provide researchers in Alberta with a knowledge based on apprenticeship trade and related training in

that country.

Bemetel

The major purpose of the study was to give a description of the apprenticeship training methodology of the Bemetel Foundation in The Netherlands. The study concentrated on two major aspects, which are different from the Canadian and Alberta scene. These two aspects are the control on the quality of the on-the-job training part, and the highly centralized approach to the (final) examination. The study was limited to information published by Dutch writers on the Bemetel organization and to responses made by the participants in the study to questions directed to them in personal interviews during a visit by the researcher to Holland during 1973.

An interview schedule was designed to structure the interviews. The interview schedule was reviewed by the Chairman of the Department of Industrial and Vocational Education. The original English version of the interview questions was translated into Dutch and the Dutch version was back-translated into English to verify the accuracy. The questions on the interview schedule were grouped in four categories, dealing respectively with: (1) Organization, (2) Control, (3) Curriculum, and (4) Examinations. It was found that items (1) and (3) above, although varying in some aspects, were not substantially different from the Canadian

or Alberta approach. Items (2) and (4) differed though in philosophy and level of development. It was therefore decided to concentrate on these varying aspects, and to provide as much descriptive detail as feasible to assist future researchers.

The Apprenticeship System in The Netherlands

The Dutch apprenticeship system is regulated by the Apprenticeship Act; initially passed in 1919, it was amended in 1968. The apprenticeship system is under the purview of the Ministry of Education and Sciences. The same Ministry is also responsible for the technical, i.e., vocational education and consequently, there is close articulation between the apprenticeship system and technical education. The Minister and Parliament receive direct input from an Advisory Council, the members of which are representatives of the Federation of Employers Associations and the Federation of Workers Unions. Under the Apprenticeship Act, indentured apprentices are obliged to take courses related to their occupational field, while serving an apprenticeship. These, generally part-time day-release courses, are offered at technical schools. Indentured apprentices attend these courses on their employers' time.

The apprenticeship system in The Netherlands is established in many occupations. Clusters of occupations are generally coordinated by "Stichtingen". Considering the

compulsory (under the law), non-profit status of the "Stichtingen", this researcher feels the term should be translated as "Foundation", rather than Institute as Gregoire (1972, p. 29) suggests. These "Stichtingen" or Foundations made up of employers and labour are the governing bodies of apprenticeship training in clusters of occupations. Bemetel, which represents the metal and electrical industries, is one of the major ones existing in The Netherlands. The Foundations representing the motor-mechanic and related trades and the one representing the electronic industries are also major ones.

The concentration of the programs is in the (traditional) technical trades, which, without exception, are all apprenticeable. The Dutch officials interviewed pointed out that they considered the system incomplete. They referred to expansion underway in the agricultural sector and in the field of domestic occupations (for girls), and mentioned the planning underway and already partially implemented of extending the apprenticeship system to occupations for office workers. In summarizing the impressions of the interviews, the main concerns of the officials centered on providing control, primarily to give recognition to the changing skills that are used on the job and to ensure that all groups involved with the training are satisfied that training suitable for the job and trade in question is actually carried out.

The examination system is seen as embracing a quality

control function. Test development and test supervision center on surveying the results of the training in order that the training system, as a whole, is functioning as it was designed.

The findings obtained by about 300 markers evaluating thousands of workpieces during a period of approximately two weeks are, according the interviewed personnel, fed back into the system. The system can thus adjust itself to the changing demands of the job, of the trade, and of the world of work as a whole. The responsibility of the employers for the on-the-job training of their workers receives by this approach close scrutiny. It shows where their own employees rate in comparison to the national (average) standard, and provides information as to which aspects of training require attention or improvement.

Conclusions

It can be concluded from the research that the training of apprentices can be systematic. The job-centered training puts some of the responsibility for apprentice training on the employer. A major function of the Foundation is that of quality control. It ensures that the standards of apprenticeship be set and maintained. The observations show that primarily those employers who give their apprentices sufficient breadth of experience are permitted to engage apprentices at a standard sufficiently high for

the economic well-being of the particular industry.

Recommendations for Further Study

A study assessing in detail the applicability of the methods of Bemetel to the apprentice training in Alberta is a necessary further step in developing an up-to-date and viable system of manpower development under the auspices of the Provincial Apprenticeship and Tradesmen's Certification Branch.

It is further recommended that a study be undertaken to determine the cost of the current block-release approach, (which in Canada, is combined with Federal subsidization in the form of training allowances), versus a day-release scheme. The concentration of the industries in Alberta in the major urban centres, which hold 80 percent of the provincial population, should make such an approach viable in the 1980's. This study is especially recommended, since the Dutch authorities claimed that their methodology, trained apprentices at a lower cost and with lower attrition than the "old" methods. They stated that these factors were the reason Bemetel's approach was being instituted in England, Sweden and Italy.

Finally, it is recommended that a study be undertaken as to how to mesh the preliminary education with the needs of apprenticeship training. It is postulated that the education in the elementary and the high schools is not suffi-

ciently preparatory to allow switching from off-job to on-job education respectively, training and vice versa.

Personal Analysis

Although comparing a system in one society with that in another is fraught with pitfalls, there is sufficient similarity between The Netherlands and Canada that in the opinion of this researcher the use of consultants is not only feasible in Canada and especially Alberta, which has among the Provinces' one of the more vigorous systems, but even essential. As shown in the first chapter one of the major weaknesses in Alberta is the lack of control over the on-the-job aspect of the training. Some apprentices receive broad and diverse instruction from their employers, others, and it seems to be the majority, are primarily counted as "a pair of hands" rather than trainees, and are given repetitive tasks which neither challenge the apprentice nor increase his knowledge.

The highly centralized examination procedure existing, not only in The Netherlands, but in Europe in general might encounter resistance and difficulties when introduced here. The geographical conditions for one are a major difficulty. Considering the high mobility of the North American population the system ought to be nation-wide, but Canada is still far behind in equalizing regional disparities. The general tenet among the population against centralized control would

be another difficulty, while the cost involved in administrating examinations on a large scale, especially practical examinations, might be another if not the major stumbling block. In recent years the Alberta Apprenticeship and Trade Certification Branch has increasingly been abandoning practical trade tests in many trades, on account of the (high) cost involved. The experience with and debate regarding the grade 9 and 12 Departmentals does not bode well for the adoption of the examination part of the Dutch system of apprenticeship training.

Epilogue

Many authors have focused attention on the serious shortcomings and problems in attempts to prepare young people for adult work and life. Indeed we desperately need new rites of passage from adolescence to adulthood. To be sure, many attempts have been made, and it is hoped that this one will - though not a giant leap - at least represent one small step forward in the development of a comprehensive manpower strategy for Alberta.

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APPENDICES

APPENDIX A

INTERVIEW SCHEDULE

INTERVIEW SCHEDULE

As the letter of introduction from the Chairman of the Department of Industrial and Vocational Education, Faculty of Education of the University of Alberta, in Edmonton, Alberta, and the letter from the Director of Research and Academic Development of the Northern Alberta Institute of Technology, and the fraternal letter of the President of the Civil Service Association of Alberta, Canada, suggest, I am a graduate student at the above Faculty, writing a thesis as part of the requirements for the degree of Master of Education.

The subject of research under the thesis requirements is a descriptive analysis of the apprenticeship training systems in The Netherlands, with specific emphasis on the organizational aspects and on the training methodology of the Bemetel Foundation.

The proposed title of the thesis is: The Bemetel System of Apprenticeship Training.

During this interview, which you have so kindly granted me, I hope to collect some of the data required for this research endeavour. To expedite the interview and to assure accuracy, I would like to use a tape recorder, if there is no objection.

The questions are grouped under four headings, pertaining respectively to the (1) Organization; (2) Control; (3) Curriculum; and (4) Examinations of the apprenticeship training system in The Netherlands.

Interview Schedule

A. Questions pertaining to the Structure of Apprenticeship training.

1. In the field of the organization of training, there exists in The Netherlands a Central Institute for Training. How does this Institute operate?
2. The Board of the Central Institute is assised by an Advisory Council, the members of which are representatives of the federation of employers associations and the federation of workers unions. This Council reports to the Minister and to the Parliament. Is the Council generally successful in pleading the interests of the members?
3. Which conditions are embodied in the indenture agreement between the contracting parties?
4. What are the criteria that are used to decide whether an apprentice can sign an indenture contract?
5. How is the administration of Bemetel conducted?

B. Questions pertaining to the Control of Apprenticeship training.

1. In which manner is there control that the Foundations operate within the framework of the law?
2. It is stated that the consultants are the key-men in the apprentice system. What are they charged with?
3. How rigid is the demand on the employers to provide a broad-based training program?

4. Is it correct that where a particular employer is not cooperating, he may be refused further apprentices to be indentured by the Foundation(s)?
5. What are the educational requirements required for the position of consultant?
6. How are the consultants chosen or appointed and who controls the consultants.

C. Questions pertaining to the Curriculum in Apprenticeship training.

1. How are the decisions regarding curricula and course content arrived at?
2. There is a general complaint in the New World that much material taught is never used by the apprentice. Is this concern also voiced here?
3. Larger firms have established a "special apprentice department". What is meant by this and how does it operate?
4. The learning programs for Bemetel participants are centrally produced. Is there a standard procedure by which the content is decided upon?
5. Considering technological change, are there provisions to keep the consultants abreast of the rapid rate of change occurring in the industries?

D. Questions pertaining to the Examinations Procedures in the Bemetel Apprenticeship training.

1. There is great emphasis placed on a hands-on, on-the-job examination at Bemetel. How is the knowledge of supporting theory assessed?

2. Is there concern that the (new) scoring method Bemetel developed is so time-consuming, it appears to take up to two weeks, and entails a workforce of over 300 persons?

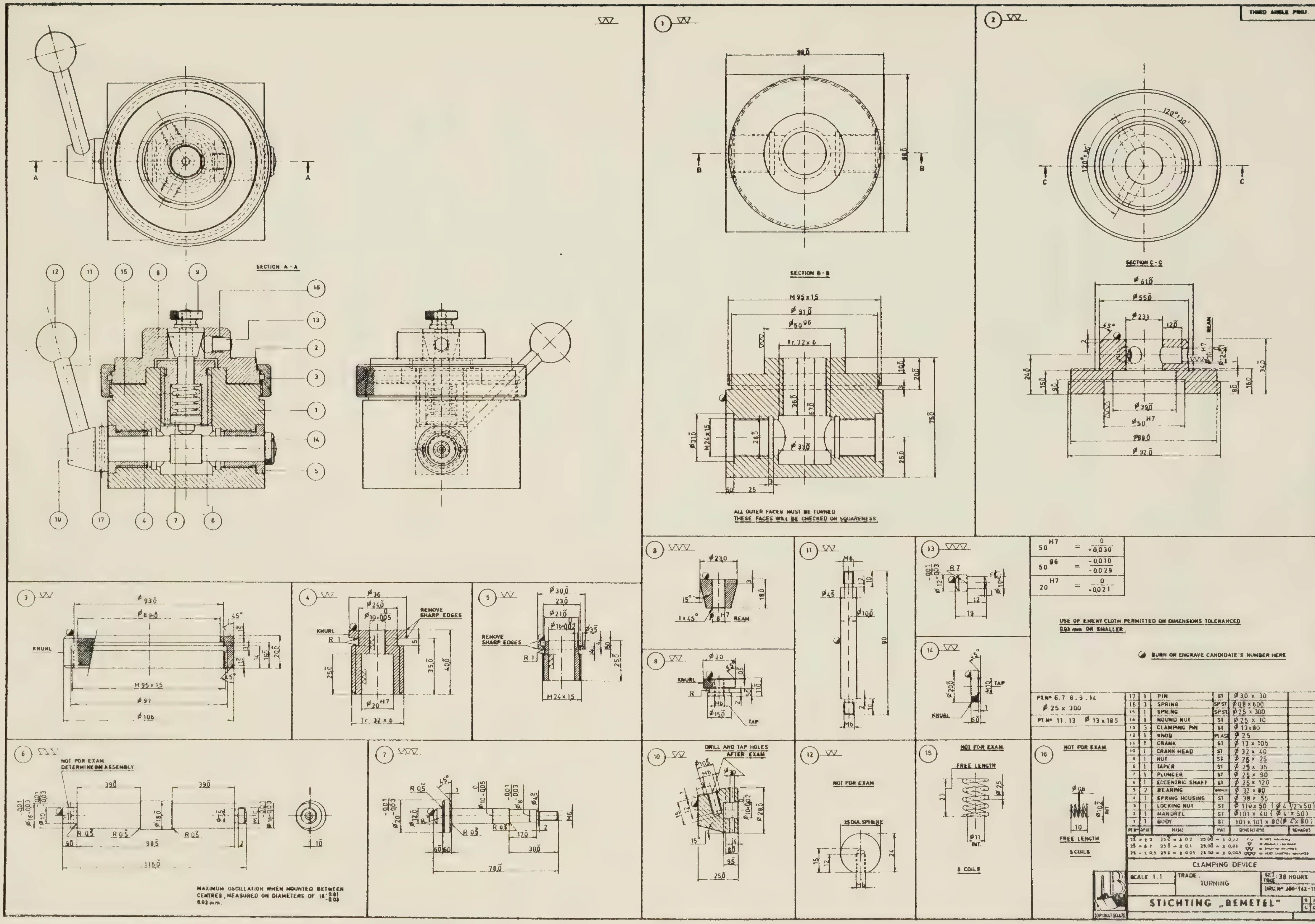
3. The rating of the work-piece produced by the apprentice for his final examination is on a strict pass or fail basis. Is there opposition to such a "one-shot" only opportunity of the learner to prove his skills?

4. It is suggested that the Bemetel approach has resulted in the apprentice now battling the training standard rather than battle with his fellow apprentice. Is this part of the objective?

APPENDIX B

MARKING SHEET

CLAMPING DEVICE



PT Nº	Nº OFF	NAME	MAT	DIMENSIONS	REMARKS
17	1	PIN	ST	Ø 30 x 30	
16	3	SPRING	SP ST	Ø 08 x 600	
15	1	SPRING	SP ST	Ø 25 x 300	
14	1	ROUND NUT	ST	Ø 25 x 10	
13	3	CLAMPING PIN	ST	Ø 13 x 80	
12	1	KNOB	PLAST	Ø 25	
11	1	CRANK	ST	Ø 13 x 105	
10	1	CRANK HEAD	ST	Ø 32 x 40	
9	1	NUT	ST	Ø 25 x 25	
8	1	TAPER	ST	Ø 25 x 35	
7	1	PLUNGER	ST	Ø 25 x 90	
6	1	ECCENTRIC SHAFT	ST	Ø 25 x 120	
5	2	BEARING	BRONZE	Ø 32 x 80	
4	1	SPRING HOUSING	ST	Ø 38 x 55	
3	1	LOCKING NUT	ST	Ø 110 x 50 (Ø 4 1/2" x 50)	
2	1	MANDREL	ST	Ø 101 x 40 (Ø 4" x 50)	
1	1	BODY	ST	101 x 101 x 80 (Ø 4" x 80)	

MARKING SHEET

TRADE: Turning. DRG.200-T42-11. Bemetel Examination June 1962.

CLAMPING DEVICE TIME: 40 Hours

DIMENSIONS

Tolerance range 0.01 - 0.02 mm

Definition		Dim.	Tolerances		Points
1. Pt.No.1	Outside dia. g 6	50	-0.010	-0.029	8
2. Pt.No.5	Bore 2x	16	0	+0.02	16
3. Pt.No.6	Outside dia.. 2x	16	-0.01	-0.03	16
4.	Outside dia.	10	-0.01	-0.03	8
5. Pt.No.7	Outside dia.	20	-0.01	-0.03	8
6.	Outside dia.	8	-0.01	-0.03	8
7. Pt.No.10	Bore	10	0	+0.02	8
8. Pt.No.13	Outside dia. 3x	12	-0.01	-0.03	24
TOTAL POINTS TOLERANCE RANGE 0.01 - 0.02 mm					96

Tolerance range 0.02 - 0.03 mm

9. Pt.No.2	Bore H 7	50	0	+0.03	7
10. Pt.No.4	Bore H 7	20	0	+0.021	7
TOTAL POINTS TOLERANCE RANGE 0.02 - 0.03 mm					14

Tolerance range 0.05 mm

11. Pt.No.4	Bore	10	0	+0.05	6
12. Pt.No.7	Outside dia.	10	0	+0.05	6
TOTAL POINTS TOLERANCE RANGE 0.05 mm					12

Tolerance range 0.1 mm

13. Pt.No.1	Depth 2x	5	$\pm$0.05		8
14. Pt.No.2	Bore	23.1	$\pm$0.05		4

Definition		Tolerances			Points
15.Pt.No.2	Flange thickness	16	±0.05		4
16.Pt.No.8	Outside dia.	23	±0.05		4
17.Pt.No.13	Outside dia. 3x	10	0	-0.1	12
TOTAL POINTS TOLERANCE RANGE 0.1 mm					32

Tolerance range 0.2 mm

18.Pt.No.1	Width 2x	98	±0.1		6
19.	Bore 2x	31	±0.1		6
20.	Height of spiggot	10	±0.1		3
21.Pt.No.2	Outside dia.	55	±0.1		3
22.	Outside dia.	88	±0.1		3
23.	Outside dia.	92	±0.1		3
24.	Height	34	±0.1		3
25.	Depth	15	±0.1		3
26.Pt.No.3	Bore	89	±0.1		3
27.	Bore	93	±0.1		3
28.Pt.No.5	Outside dia. 2x	30	±0.1		6
29.Pt.No.6	Length	9	±0.1		3
30.	Length	98.5	±0.1		3
31.	Outside dia.	18	±0.1		3
32.Pt.No.7	Length	6	±0.1		3
33.	Length	17	±0.1		3
34.Pt.No.8	Length	18	±0.1		3
35.Pt.No.10	Outside dia.	28	±0.1		3

Definition		Dim.	Tolerances		Points
36.	Length	25	± 0.1		3
37.	Depth	9.5	± 0.1		3
38.Pt.No.11	Outside dia.	10	± 0.1		3
TOTAL POINTS TOLERANCE RANGE 0.2 mm					72

MARKING OUT

Award points on the following scale;

3 = Outstanding; 2 = Good; 1 = Average; 0 = Poor.

For toleranced dimensions award points as follows:

0 mm deviation from tolerance range = 3 points
Up to 0.1 mm deviation from tolerance range = 2 points
Up to 0.2 mm deviation from tolerance range = 1 point
More than 0.2 mm deviation from tolerance range = 0 points

39.Pt.No.1	Outside dia. 50 g 6 in the centre of body $98.\overline{0} \times 98.\overline{0}$		0 - 3	(4)	12
40.	D. of bore $31.\overline{0}$, $25.\overline{0}$ from base of body		0 - 3	(4)	12
41.	Bore $31.\overline{0}$ in centre of face $98.\overline{0} \times 50.\overline{0}$		0 - 3	(2)	6
42.	Squareness of body 6 faces	6x	0 - 3		18
43. Pt.No.2	D of bores, 10 H 7, $24.\overline{0}$ from face of mandrel	3x	0 - 3	(2)	18
44.	Bores 10 H 7, equally spaced at $120^{\circ} \pm 30'$	3x	0 - 3	(2)	18
45. Pt.No.6	Eccentric dia. $18.\overline{0}$, $1.\overline{0}$ from centre line of shaft		0 - 3	(4)	12
46.	Shaft dia. $16^{-0.01}_{-0.03}$		0 - 3	(2)	6
TOTAL POINTS MARKING OUT					102

FITTING

Definition		Dim.	Tolerances		Points
47.	Pt.No.1 and 5	2x	0 - 3		6
48.	Pt.No.1 and 4		0 - 3	(3)	9
49.	Pt.No.1 and 3		0 - 3		3
50.	Pt.No.6 and 14		0 - 3		3
51.	Pt.No.7 and 9		0 - 3		3
52. Pt.No.11	Fitting of nuts to thread M 6	2x	0 - 3		6
TOTAL POINTS FITTING					30

SURFACE FINISHING { Faces with a tolerance range larger than 0.03 mm which have been emery papered - Award 0 points.

53. Pt.No.1	Outer faces smoothly finished to VV		0 - 3		3
54.	Outer faces finished to VVV		0 - 3		3
55.	Bores finished to VV		0 - 3		3
56. Pt.No.2	Outer faces finished to VV		0 - 3		3
57.	Bores finished to VV		0 - 3		3
58.	Bores finished to VVV		0 - 3		3
59.	Finish of reamed holes VVV		0 - 3		3
60. Pt.No.3	Outer faces finished to VV		0 - 3		3
61.	Bores finished to VV		0 - 3		3
62.	Condition of knurling		0 - 3		3
63. Pt.No.4	Outer faces finished to VV		0 - 3		3
64.	Bores finished to VVV		0 - 3		3

Definition		Dim.	Tolerances		Points
65. Pt.No.5	Outer faces finished to VV	2x	0 - 3		6
66.	Bores finished to VVV	2x	0 - 3		6
67. Pt.No.6	Outer faces finished to VVV		0 - 3		3
68. Pt.No.7	Outer faces finished to VVV		0 - 3		3
69. Pt.No.8	Outer faces finished to VVV		0 - 3		3
70.	Reamed hole H 7 finished to VVV		0 - 3		3
71. Pt.No.9	Outer faces finished to VV		0 - 3		3
72.	Condition of knurling		0 - 3		3
73. Pt.No.10	Faces and bores finished to VV		0 - 3		3
74. Pt.No.11	Outer faces finished to VV		0 - 3		3
75. Pt.No.13	Outer faces finished to VVV	3x	0 - 3		9
76. Pt.No.14	Outer faces finished to VV, knurling in good condition		0 - 3		3
TOTAL POINTS SURFACE FINISHING					84

Radii and tapers

77. Pt.No.7	Condition of radius R 7		0 - 3		3
78. Pt.No.8	Correct taper 15°		0 - 3		3
79. Pt.No.10	Correct taper 15°		0 - 3		3
80. Pt.No.13	Condition of radius R 7	3x	0 - 3		9
TOTAL POINTS RADII AND TAPERS					18

Finishing of threads

Definition		Dim.	Tolerances		Points
81. Pt.No.1	Condition of thread Tr 32 x 6		0 - 3	(3)	9
82.	Condition of thread M 24 x 1.5	2x	0 - 3		6
83. Pt.No.3	Condition of thread M 95 x 1.5		0 - 3	(2)	6
84. Pt.No.4	Condition of thread Tr 32 x 6		0 - 3	(3)	9
85. Pt.No.5	Condition of thread M 24 x 1.5	2x	0 - 3		6
86. Pt.No.6	Condition of thread M 10		0 - 3		3
87. Pt.No.7	Condition of thread M 6		0 - 3		3
88. Pt.No.9	Condition of tapped hole M 6		0 - 3		3
89. Pt.No.11	Condition of thread M 6		0 - 3		3
90. Pt.No.14	Condition of tapped hole M 10		0 - 3		3
TOTAL POINTS FINISHING OF THREADS					51

SUMMARY

		Total Points
DIMENSIONS: Tolerance range 0.01 - 0.02 mm	1 x 96 =	96
Tolerance range 0.02 - 0.03 mm	1 x 14 =	14
Tolerance range 0.5 mm	1 x 12 =	12
Tolerance range 0.01 mm	1 x 32 =	32
Tolerance range 0.02 mm	1 x 72 =	72
MARKING OUT	1 x102 =	102
FITTING	1 x 30 =	30
SURFACE FINISHING	1 x 84 =	84
RADII AND TAPERS	1 x 18 =	18
FINISHING OF THREADS	1 x 51 =	51
	TOTAL POINTS =	511
	Percentage =	100%
	Quality Mark 100 % =	9

SET TIME: 40 Hours

By exceeding set time: 30% longer than set time =-1 point or pro rata

By completing in less than set time:

Quality mark 8-9: 20% less than set time = +1 point or pro rata
" " 7-8: 30% " " " " = +1 " " " "
" " 6-7: 40% " " " " = +1 " " " "

FINAL EVALUATION:

Up to 5.5 points - Unsatisfactory
5.5 to 7.0 points - Satisfactory
7.0 to 8.5 points - Good
Over 8.5 points - Outstanding

APPENDIX C

CONSTITUTION OF THE "STICHTING BEMETEL"

Artikel 1

De Stichting draagt de naam „Stichting Bedrijfsopleiding Metaal- en Electrotechnische Industrie", bij afkorting genaamd „BEMETEL" en is gevestigd te 's-Gravenhage.

Artikel 2

1. De Stichting heeft tot doel het bevorderen en regelen van de vakopleiding in de ruimste zin des woords in de metaal- en electrotechnische industrie door middel van alle haar ten dienste staande wettige middelen.

2. De Stichting kan haar werkzaamheden tevens uitstrekken tot ondernemingen, behorende tot een andere bedrijfstak, in welker werkplaatsen gelegenheid bestaat metaalbewerkers op te leiden.

Artikel 3

1. Het Bestuur van de Stichting wordt benoemd door de Stichting Raad van Overleg in de Metaalindustrie, zijnde het gemeenschappelijk orgaan van de werknemers- en werkgeversorganisaties in de metaal- en electrotechnische industrie.

2. Het Bestuur zal bestaan uit ten minste zestien en ten hoogste twintig leden waarvan naast de werkgevers- en werknemersleden, ten minste één lid uit de kring van het schoolwezen wordt benoemd en één lid uit de kring der ouders.

3. Het Bestuur wijst uit zijn midden een voorzitter en een of meer vice-voorzitters aan.

Artikel 4

Het Bestuur benoemt één of meer secretarissen die tevens zijn belast met de dagelijkse leiding.

Artikel 5

De Stichting wordt in en buiten rechte vertegenwoordigd door voorzitter en secretaris of hun beider plaatsvervangers.

Artikel 6

Het Bestuur besluit, behoudens het bepaalde in artikel 9, bij gewone meerderheid van stemmen. Bij staking van stemmen beslist de voorzitter, of bij diens ontstentenis de vice-voorzitter.

Artikel 7

De inkomsten en bezittingen van de Stichting bestaan uit:

a. het ingebrachte kapitaal:

b. overheidssubsidie;

c. bijdragen van de organisaties vertegenwoordigd in het bestuur van de in artikel 3 lid 1 genoemde Stichting Raad van Overleg in de Metaalindustrie.

d. toevallige baten, giften en alle andere onvoorziene inkomsten.

Artikel 8

1. De geldmiddelen van de Stichting worden onder toezicht van het Bestuur beheerd door de secretaris.
De secretaris ontwerpt de begroting voor het komende boekjaar en de rekening en verantwoording over het afgelopen boekjaar en legt deze ter goedkeuring aan het Bestuur over. Het boekjaar valt samen met het kalenderjaar.

2. Het Bestuur wijst uit zijn midden aan een lid dat in het bijzonder met het in het eerste lid bedoelde toezicht van het Bestuur is belast.

3. De goedkeuring van de rekening en verantwoording door het Bestuur strekt tot volledige décharge van het gevoerde beheersbeleid.

Artikel 9

1. Het Bestuur is bevoegd onder goedkeuring van de Stichting Raad van Overleg in de Metaalindustrie wijziging te brengen in de bepalingen dezer statuten, mits zulks — behoudens het bepaalde in het volgende lid — geschiedt in een bestuursvergadering, waarin tenminste drie/vierde deel van het aantal bestuursleden aanwezig is en met een meerderheid van tenminste drie/vierde van de uitgebrachte stemmen, indien nodig naar boven tot een geheel getal afgerond.

2. Mocht op de dag der bijeenroeping van de in het vorige lid bedoelde vergadering, waarin tot wijziging der statuten zou worden besloten, niet het vereiste aantal bestuursleden aanwezig zijn, dan is de voorzitter, of bij diens ontstentenis de vice-voorzitter, bevoegd een tweede bestuursvergadering bijeen te roepen, welke zal plaatsvinden nadat ten minste zes en ten hoogste acht weken na de eerste vergadering zullen zijn verstreken. Een in deze vergadering genomen beslissing tot wijziging der statuten kan slechts worden genomen met een meerderheid van drie/vierde der door de aanwezige bestuursleden uitgebrachte stemmen, indien nodig naar boven tot een geheel getal afgerond.

3. Het in het eerste en tweede lid bepaalde geldt dienovereenkomstig ten aanzien van de ontbinding van de Stichting, met dien verstande, dat in een eerste vergadering een besluit tot ontbinding met drie/vierde van de uitgebrachte stemmen slechts kan worden genomen in een voltallige bestuursvergadering.

4. De oproepingen tot de in dit artikel genoemde vergaderingen dienen ten minste drie weken tevoren te worden gedaan en zullen vermelden, dat omtrent wijziging der statuten of wel ontbinding der Stichting zal worden beraadslaagd.

5. Na ontbinding geschiedt de liquidatie door de ten tijde der ontbinding fungerende bestuursleden.

6. Indien na voldoening der schulden en bestrijding van de kosten van liquidatie een batig saldo overblijft wordt dit saldo, met inachtneming van de daartoe geldende uitvoeringsvoorschriften omtrent de bekostiging van Rijkswege en van mogelijke andere wettelijke regelingen, aan de in artikel 7 onder c bedoelde organisaties in verhouding tot het aandeel, dat deze in het vermogen van de Stichting hebben bijgedragen, uitgekeerd.

Stichting Bedrijfsopleiding in de Metaal- en Electrotechnische industrie „Bemetel"

Inleiding.

In sommige Europese landen zoals Duitsland en Zwitserland is de beroepsopleiding een ononderbroken traditie die dateert uit de middeleeuwen. De systematische opleiding van leerlingen ondervond in deze landen, evenals in de meeste andere in West-Europa, een bloeiperiode in de tijd van de Gilden, maar in een aantal ervan, waaronder Nederland, werd deze vorm van opleidingen verstoord door de invloed van de Franse revolutie.

Deze gebeurtenissen hebben voordelen gebracht maar ook nadelen. In landen waar de ongebroken traditie voortduurde is beroepsopleiding een natuurlijke zaak, terwijl in andere landen de leiding van de ondernemingen opnieuw ervan moest worden overtuigd, dat de opleiding van jongeren in hun eigen bedrijf een deel van hun eigen verantwoordelijkheid is en van belang zowel voor de leerling als voor het bedrijf. Deze landen hadden echter het voordeel dat zij opnieuw konden beginnen met een systeem, dat aangepast was aan de nieuwe situatie.

Sedert de laatste wereldoorlog in het bijzonder kan men spreken van de herleving van een systematische leerlingopleiding.

In vele landen hadden zich de economische en sociale omstandigheden grondig gewijzigd. In Nederland moest werk gevonden worden voor de gedemobiliseerde militairen en voor de duizenden burgerrepatrianten.

Daarbij kwam de snelle bevolkingsaanwas in ons toch al dichtbevolkte land. Hierdoor bleek het noodzakelijk een land te industrialiseren dat voordien hoofdzakelijk als agrarisch beschouwd kon worden. Niet slechts de economische situatie en de technische outillage moesten veranderen, maar de Nederlandse jeugd en hun ouders moesten overtuigd worden van het belang van technische beroepen. Eén van de voordelen in Nederland was de nauwe samenwerking tussen werkgevers en werknemersorganisaties. Deze samenwerking was gedurende de oorlog, nadat de openlijke activiteiten van werkgevers- en werknemersorganisaties onder de druk van de bezettende autoriteiten werden beëindigd, in het geheim gegroeid.

Organisatie Bemetel.

Het resultaat was, dat de in het geheim voorbereide organisatie direct na de oorlog in de openbaarheid trad als „Stichting van den Arbeid .

Het was in deze organisatie — verantwoordelijk voor de sociale aspecten van het economisch leven in Nederland — dat in 1945 het advies werd uitgebracht dat elke tak van de industrie zijn eigen landelijk orgaan behoorde te hebben voor de bevordering, ontwikkeling en toepassing van de bedrijfsopleiding, met name van het leerlingstelsel. In praktisch alle takken van industrie, zoals grafische industrie, metaalindustrie, textielindustrie, chemische industrie, bouwnijverheid enz., hebben zich als gevolg daarvan centrale opleidingsorganisaties gevormd, in wier bestuur hoofdzakelijk vertegenwoordigers van werkgevers- en werknemersorganisaties zitting hebben.

Volgens de nieuwe Wet op het leerlingwezen die in augustus 1968 van kracht werd, zullen ook het georganiseerde schoolwezen en de ouders in deze besturen zijn vertegenwoordigd. [1])

In deze samenstelling is het gemeenschappelijk belang van werkgevers en werknemers en tevens de nauwe samenhang tussen school- en bedrijfsopleiding tot uitdrukking gebracht.

In de metaal- en elektrotechnische industrie had de Metaalbond, de algemene werkgeversorganisatie, in 1938 reeds het initiatief genomen een vereniging voor de vakopleiding in het leven te roepen. Deze werd in 1945 aangepast aan de nieuwe plannen. De naam luidt: Stichting Bedrijfsopleiding Metaal- en Electrotechnische Industrie „Bemetel".[2])

Technische School.

In ons land is het voor een jongen die via de bedrijfsopleiding een geschoold vakman wil worden in het algemeen gebruikelijk dat hij na de lagere school een driejarige of vierjarige technische school bezoekt. De technische school kan beschouwd worden als een school waar algemeen vormend onderwijs wordt gegeven op technische grondslag. Deze school wil de leerling voorbereiden op zijn toekomstige werkkring, niet slechts als technicus, maar ook als mens. In deze technische school krijgen de leerlingen, naast algemene ontwikkeling ook praktisch werk in de eigen werkplaatsen van de school.

Het eerste jaar is een algemeen jaar waar alle leerlingen hetzelfde onderwijs krijgen. In het tweede jaar volgt een splitsing in enkele groepen, waaronder metaalbewerking.

Na het behalen van het diploma kunnen zij in dienst van de bedrijven komen als leerling.

Verhouding Overheid — Opleidingsorgaan.

Het Ministerie van Onderwijs en Wetenschappen financiert ingevolge de Wet op het Leerlingwezen, de landelijke opleidingsorganen en geeft een vergoeding aan de ondernemingen waar een opleiding plaatsvindt.

[1]), [2]), *De in de tekst vermelde cijfers verwijzen naar documentatiebladen die uitgebreider informaties bevatten. De verwijzingen zijn opgenomen aan het eind van dit artikel.*

Het Ministerie betaalt de exploitatiekosten van de centrale opleidingsorganisaties voorzover deze zich bezighouden met het leerlingstelsel in de strikte zin van het woord. Dit omvat bijvoorbeeld salarissen, reiskosten, administratiekosten, de kosten van de examens enz.
De vergoedingen die het Ministerie aan de bedrijven verleent, worden betaald via de Stichting Bemetel. [3])
De Stichting Bemetel vraagt de aangesloten ondernemingen een deel van deze vergoeding — overigens op basis van vrijwilligheid — aan haar af te staan ter financiering van activiteiten waarvoor geen overheidssubsidie wordt verleend.
Het feit dat het Ministerie van Onderwijs toeziet op de besteding van de beschikbaar gestelde subsidie impliceert echter niet dat zij zich mengt in de organisatie en het beleid van het opleidingsorgaan. Wel stelt de overheid bepaalde normen waaraan het opleidingsbeleid moet voldoen en er vindt regelmatig overleg plaats met de inspecteurs van het leerlingwezen. [4])

Regionale Organen.

Naast de landelijke opleidingsorganen per bedrijfstak, houden zich een aantal regionale organen bezig met bepaalde aspecten van de opleiding.
Hun bemoeiïngen liggen voornamelijk op sociaalpedagogisch terrein, op het gebied van voorlichting aan de leerlingen van Technische scholen en hun ouders en het voorzien in de behoefte aan scholen voor het algemeen en op het beroep gericht onderwijs.

Praktijkprogramma's (standaardvakeisen).

Een van de taken van Bemetel is het opstellen van praktijkprogramma's voor alle beroepen waarvoor leerlingen worden opgeleid. [5])
Deze praktijkprogramma's bevatten de minimum eisen, waaraan de leerling aan het einde van zijn opleiding moet voldoen.
Alle aan de opleiding van leerlingen deelnemende bedrijven moeten hun leerlingen opleiden tot dit peil, onafhankelijk van grootte en aard van het bedrijf.
Bij het samenstellen van deze praktijkprogramma's wordt de Stichting „Bemetel" bijgestaan door deskundigen uit de industrie.
Deze praktijkprogramma's zijn dus geen programma's in die zin, dat zij stap voor stap de opleidingsgang voorschrijven. De Stichting „Bemetel" is van mening, dat de opleiding van leerlingen aangepast moet worden aan de specifieke omstandigheden in elk bedrijf of in elke tak van industrie. Dit betekent onder andere dat de opleiding door middel van produktiewerk kan plaatsvinden; voor de verlaging van de opleidingskosten èn voor de vergroting van de belangstelling van de leerling is het zelfs aan te bevelen, mits het produktiewerk past in de opleiding. In deze praktijk-programma's zullen tevens worden opgenomen de eisen die gesteld worden ten aanzien van het op het beroep gericht onderwijs en van het algemeen onderwijs in zoverre dat met de uitoefening van het beroep verband houdt.

Duur van de opleiding.

De duur van de opleiding is afhankelijk van het te leren beroep en de vooropleiding.
Voor het merendeel van de beroepen in de metaal- en elektrotechnische industrie bedraagt de opleidingstijd twee jaar mits de leerlingen in het bezit zijn van een diploma van een technische school. Zonder T.S.-diploma duurt de opleiding een jaar langer.
Voor enkele opleidingen, o.a. voor gereedschapmakers, instrumentmakers e.d. is de opleidingsduur 3 jaar, voor leerlingen met het T.S.-diploma; voor de anderen 4 jaar.

Leerovereenkomst.

De wettelijke basis voor een opleiding is de leerovereenkomst die gesloten wordt tussen de werkgever en de leerling (of bij minderjarigheid zijn wettelijke vertegenwoordiger).
Op grond van deze overeenkomst verplicht de werkgever zich de leerling een opleiding te geven volgens de eisen gesteld in het praktijkprogramma, terwijl de leerling zich verplicht deze opleiding te volgen. Deze leerovereenkomst, waarin een reeks bepalingen met betrekking tot de opleiding staan vermeld, wordt gesloten ten overstaan van de Stichting Bemetel en mede door haar ondertekend.
Hierdoor aanvaardt Bemetel de verantwoording voor het toezicht op en het naleven van de verplichtingen die de leerovereenkomst voor beide partijen inhoudt.
Aangezien Bemetel een organisatie is van de metaal- en elektrotechnische industrie en haar bestuur hoofdzakelijk bestaat uit vertegenwoordigers van werkgevers en werknemers moet men deze controle van Bemetel dan ook zien als een toezicht dat men zelf gewild en gecreëerd heeft.

Arbeidsverhouding.

Geen leerovereenkomst is mogelijk zonder arbeidsovereenkomst. Beëindiging van de arbeidsovereenkomst heeft verbreking van de leerovereenkomst tengevolge. De bepalingen van de leerovereenkomst en die van de arbeidsovereenkomst mogen uiteraard niet met elkaar in strijd zijn.
Het bestaan van een arbeidsovereenkomst naast een leerovereenkomst heeft het voordeel dat de leerling loon ontvangt en de voordelen van de sociale wetgeving geniet.

Algemeen en op het beroep gericht onderwijs.

Naast de praktijkopleiding die in en door het bedrijf verzorgd wordt, zijn de leerlingen, overeenkomstig de bepalingen van de Wet op het leerlingwezen, verplicht een school voor beroepsonderwijs te bezoeken, hetzij gedurende één dag per week (part time), hetzij een halve dag plus twee avonden, hetzij drie avonden.

Aan het eerste wordt de voorkeur gegeven. Uitsluitend avondonderwijs komt thans bijna niet meer voor.

Op de school ontvangt de leerling technisch-theoretisch onderwijs betrekking hebbend op het beroep waarvoor hij een praktijkopleiding ontvangt. Tevens wordt aandacht geschonken aan zijn algemene ontwikkeling.

Algemene ontwikkeling.

In een moderne vakopleiding is het zeer belangrijk dat meer aandacht wordt besteed aan algemene ontwikkeling; niet omdat de leerlingen ons parlementaire stelsel in details moeten kennen of de juiste data van de oorlogen waarin ons land in de geschiedenis betrokken is geweest, maar omdat het noodzakelijk is hen voor te bereiden op hun rol in de onderneming en de samenleving. Zij moeten leren verantwoordelijkheid te dragen tegenover zichzelf, hun familie, hun medewerkers en de gemeenschap. Hier ligt een gemeenschappelijke taak voor onderneming en school.

Werkboek.

Iedere leerling ontvangt van de Stichting Bemetel een werkboek waarin hij dagelijks zijn verrichte werkzaamheden dient te vermelden.

Tevens zal hij in dit werkboek schriftelijke opdrachten en tekeningen moeten uitwerken.

In eerste instantie wordt het werkboek beoordeeld door de leermeester, die het gemaakte werk met een cijfer waardeert en daarin tevens de beoordeling van de eventuele proefwerkstukken noteert.

De leerlingen moeten deze werkboeken mede door hun ouders laten paraferen, zodat ook zij op de hoogte gehouden worden van de prestaties van hun zoon. Eveneens verschaft het werkboek aan de consulent het nodige inzicht in de tewerkstelling en de vorderingen van de leerling.

Zeer belangrijk is tenslotte het feit dat het werkboek mede bepalend is voor het al dan niet deelnemen aan het examen. Wanneer een leerling een onvoldoend eindcijfer voor zijn werkboek krijgt mag hij niet aan het examen deelnemen.

De leermeester. *)

De opleiding van de leerlingen wordt in het bedrijf opgedragen aan een leermeester. Al naar gelang aard en grootte van het bedrijf en afhankelijk van de wijze waarop de opleiding plaats vindt zien wij verschillen in de functie, plaats en dagtaak van de leermeester.

Er zijn bedrijven waar een leermeester uitsluitend déze functie vervult waarbij het kan voorkomen dat de opleiding plaatsvindt in een aparte leerschool van het bedrijf, ofwel dat de leerlingen in de produktie-afdeling tewerkgesteld worden, al dan niet in een afzonderlijke „leerlingen-hoek". Het komt echter ook voor, vooral in kleinere bedrijven, of daar waar het aantal leerlingen zeer beperkt is, dat de baas of chef van een bepaalde afdeling in het bedrijf tevens leermeester is.

Het bedrijf is vrij in het bepalen van de leersituatie, mits men voldoende rekening houdt met en aandacht schenkt aan de opleiding, het praktijk-programma en de gestelde leertijd.

Consulenten.

De consulent is in het algemeen een technicus van H.T.S.-niveau of de bezitter van een N-akte, met bedrijfservaring.

Hij is tevens in het bezit van een pedagogisch getuigschrift.

De belangrijkste taak van de consulenten is: de aangesloten bedrijven te helpen bij het uitvoeren en instandhouden van opleidingsmethoden, gericht op de praktijkprogramma's en de mogelijkheden van het individuele bedrijf.

Regelmatig bezoekt de consulent de aan zijn toezicht toevertrouwde bedrijven en stelt zich daarbij op de hoogte van de vorderingen en de tewerkstelling van de leerlingen. Tevens staat hij de leermeesters bij met adviezen betreffende opleiding, opleidingsmethoden en leermiddelen.

Door zijn contacten met de opleidingsfunctionarissen van veel bedrijven en scholen doet hij belangrijke ervaringen op, die aan de gezamenlijke opleiding ten goede komen.

De consulenten spelen daarnaast een belangrijke rol bij het ontwerpen van leermiddelen en de organisatie van de examens. [6])

Leermiddelen.

Het ontwerpen van leermiddelen voor de verschillende beroepen behoort mede tot de activiteiten van de Stichting Bemetel.

In de loop der jaren werden een aantal leerboeken ontwikkeld bestemd voor het algemeen en op het beroep gericht onderwijs, en werden series oefenwerkstukken, praktische oefeningen en takenboeken ontworpen als hulpmiddel voor de praktijkopleiding in het bedrijf.

Ook aan de ontwikkeling van audiovisuele leermiddelen wordt in belangrijke mate gewerkt. Zo wer-

*) *zie ook de brochure „De Bedrijfsleermeester" door drs. W. Putman Cramer, uitgave Stichting Bemetel.*

den in de loop der jaren een groot aantal filmstroken, enkele instructiefilms, flanelbordmateriaal, modellen, transparanten voor de overheadprojector enz. ontwikkeld.[7])

Examen.

De examens die aan het einde van de opleidingsperiode worden afgenomen, worden geheel door Bemetel verzorgd. In het Bemetel-examensysteem moeten de leerlingen die in één beroep zijn opgeleid aan het einde van hun opleidingsperiode, allen hetzelfde examenwerkstuk maken, in dezelfde week en volgens dezelfde werktekening door Bemetel verstrekt. Dit examenwerkstuk wordt vastgesteld door een examencommissie, bestaande uit bedrijfs- en schooldeskundigen, die op voorstel van de Stichting Bemetel door de Minister van Onderwijs en Wetenschappen worden benoemd.
Al deze examenwerkstukken worden op één plaats — het opmeetcentrum — tezamen gebracht, waar zij gedemonteerd, gecontroleerd, gemeten en beoordeeld worden door vakexperts, door de industrie ter beschikking gesteld.

Naast dit werkstukgedeelte moet de leerling nog een aantal schriftelijke opgaven uitwerken op het gebied van het op het beroep gerichte onderwijs.

Evenals dit bij het werkstukgedeelte het geval is, wordt dit schriftelijk examen door de diverse examencommissies opgesteld en door hen centraal beoordeeld.

Dit Bemetel-examensysteem heeft de volgende voordelen:

a. er wordt een nationaal peil van vakbekwaamheid gehandhaafd;
b. elke onderneming heeft de gelegenheid om een vergelijking te maken tussen zijn eigen resultaten en het nationaal gemiddelde;
c. regionale- of plaatselijke tekortkomingen en onvolmaaktheden komen aan de dag en kunnen worden besproken met school of bedrijf in kwestie;
d. algemene tekortkomingen en onvolmaaktheden kunnen vastgesteld worden waardoor geëigende maatregelen genomen kunnen worden om deze in de toekomst te voorkomen.

Een punt van veel betekenis is dat — wanneer de duizenden werkstukken gecontroleerd en beoordeeld worden in het opmeetcentrum — de 300 of meer experts uit de bedrijven deze bijzondere gelegenheid kunnen benutten voor het uitwisselen van gegevens, ervaringen en ideeën.[8])

Diploma.

Voormelde examencommissies beoordelen in laatste instantie de examenresultaten en adviseren de Stichting Bemetel omtrent het al dan niet uitreiken van een diploma of het laten doen van een herexamen.
Aangezien de aan de opleiding te stellen eisen op voorstel van het opleidingsorgaan door de Minister van Onderwijs en Wetenschappen worden goedgekeurd en de examencommissieleden krachtens het vanwege deze minister afgegeven benoemingsbesluit als rijksgecommitteerden worden beschouwd, is ook het diploma een wettelijk erkend diploma dat tevens een door het bedrijfsleven erkende waarde heeft.

Bemetel-berichten.

De Stichting geeft een mededelingenblad uit, dat maandelijks verschijnt. Hierin worden alle voor de opleiding van belang zijnde gegevens en mededelingen gepubliceerd.
Het is wenselijk dat al diegenen die met opleiding in bedrijven en scholen belast zijn, maandelijks inzage in deze publikatie krijgen.
De Bemetel-berichten worden gratis toegezonden aan alle aangesloten ondernemingen, technische scholen en al degenen voor wie deze publikatie van belang kan zijn.

Vervolgopleidingen.

In de afgelopen periode is overduidelijk gebleken dat bij het bedrijfsleven een sterke behoefte bestaat aan vervolgopleidingen ná de bestaande Bemetel-opleiding. Men is van oordeel dat het doel van deze vervolgopleidingen **niet** is de opleiding van lager leidinggevend en technisch kader, doch een verruiming en verdieping van de bekwaamheid binnen het raam van het uitvoerend vakmanschap.
Daarnaast meent men, dat een mogelijkheid moet worden geopend de periode, welke verloopt tussen het behalen van het huidige Bemetel-diploma dat opleidt tot het niveau van aankomend vakman en het verwerven van het volledige vakmanschap waarvoor een aantal jaren praktisch werk in produktie of onderhoud nodig is, beter te gebruiken door in dit praktische werk een zekere opleidingssystematiek te brengen, gecombineerd met algemeen en op het beroep gericht onderwijs.
Tenslotte zal deze opleiding, ofschoon zij niet bedoeld is als een kaderopleiding, ook kunnen dienen als een tweede opleidingsfase voor die jonge vaklieden die in een daarop volgende derde fase een opleiding zullen ontvangen welke de mogelijkheid opent van promotie tot functies waarvan men wel zegt dat zij behoren tot het lager leidinggevend en technisch kader. Hierdoor blijven de mogelijkheden tot promotie voor de geschoolde arbeiders open.

De Stichting „Bemetel" kent twee examens en wel
het Bemetel-examen en
het Uitgebreid Bemetel-examen.

I Bemetel-examen

1 Voor deelname aan het **Bemetel-examen** moet de kandidaat in het bezit zijn van een geldige leerovereenkomst.

2 De onderneming en de consulent bepalen of en wanneer de kandidaat aan het **Bemetel-examen** deelneemt.

3 Het Bemetel-examen bestaat in het algemeen uit de volgende onderdelen:

— het vervaardigen van een werkstuk
— vakleer
— tekeninglezen
— uitslaan voor plaatwerk- en scheepsbouwberoepen en voor het beroep pijpenbewerken

(vakleer, tekeninglezen en uitslaan: schriftelijk)

Voor elk van de genoemde onderdelen wordt een cijfer gegeven. Het cijfer voor het werkstuk wordt tot op één decimaal afgerond. De cijfers voor vakleer, tekeninglezen en eventueel uitslaan worden op een heel cijfer afgerond.

Hierbij gelden de volgende regels:

a Wanneer de kandidaat het vereiste aantal punten behaalt, ontvangt hij het Bemetel-diploma.

b Bij onvoldoende voor **het werkstuk** ontvangt de kandidaat geen diploma, maar mag nog éénmaal aan een volgend examen deelnemen.
Bij herexamen voor **vakleer, tekeninglezen** (en **eventueel uitslaan)** ontvangt de kandidaat geen diploma, maar mag voor deze onderdelen aan volgende Bemetel-examens deelnemen.

c Ongeacht de uitslag wordt aan de kandidaat een cijferlijst uitgereikt.

d Nimmer wordt het Bemetel-diploma verstrekt uitsluitend op grond van het vervaardigen van een werkstuk.

Examendata

Het werkstukexamen wordt gehouden in de 1e of 2e week van mei. Het vakkennisexamen wordt gehouden in de 1e week van juni.

II Uitgebreid Bemetel-examen

1 Voor deelname aan het **Uitgebreid Bemetel-examen** moet de kandidaat in het bezit zijn van een geldige leerovereenkomst of reeds het Bemetel-diploma (primaire opleiding) hebben behaald.

2 De onderneming en de directeur van de school bepalen in overleg met de consulent of en wanneer de kandidaat aan het Uitgebreid Bemetel-examen deelneemt. In bijzondere gevallen beslist het bestuur van de Stichting „Bemetel".

3 De aanmelding voor het Uitgebreid Bemetel-examen geschiedt uitsluitend door de onderneming in overleg met de consulent.

4 In het algemeen neemt een kandidaat aan het Uitgebreid Bemetel-examen deel aan het einde van de schoolopleiding.

5 Het Uitgebreid Bemetel-examen bestaat uit de volgende onderdelen:
— Nederlands
— reken- en meetkundige vakken
— natuur- en werktuigkunde
— technisch tekenen/schetsen

Hierbij gelden de volgende regels:

a Voor alle vakken wordt het examen **schriftelijk** afgenomen.

b Wanneer de kandidaat voor het Uitgebreid Bemetel-examen slaagt, ontvangt hij het Uitgebreid Bemetel-diploma, op voorwaarde dat hij reeds in het bezit is van het Bemeteldiploma (primaire opleiding). Is dit laatste niet het geval dan zal hem het diploma Uitgebreid Bemetel-examen eerst worden uitgereikt wanneer hij op een later tijdstip het Bemetel-diploma ((primaire opleiding) behaalt.

c Ongeacht de uitslag wordt aan de kandidaat een cijferlijst uitgereikt.

Examendatum

Het Uitgebreid Bemetel-examen wordt gehouden in de 1e week van juni.

Opmerking: de juiste data voor de te examineren onderdelen worden tijdig via de Bemetel-berichten bekendgemaakt.

Bemetel-cursussen

Scheepsbouw

Uitslaan en afschrijven.

Voor de opleiding „Metaalbewerken in de Scheepsbouw" volgen de leerlingen de instructielessen uitslaan en afschrijven welke door de Stichting Bemetel gegeven worden. De leerlingen ontvangen deze lessen gedurende 45 weken per jaar een halve dag per week.
Leerlingen met L.T.S.-diploma volgen deze lessen in het eerste en tweede leerjaar; indien niet in het bezit van een L.T.S.-diploma dan volgen de leerlingen deze lessen in het tweede en derde leerjaar.

Sectiebouw en afschrijven.

Deze cursus is een vervolg op de opleiding Metaalbewerken in de Scheepsbouw. De cursus duurt 1 jaar en wordt geheel gegeven door de Stichting Bemetel.

Uitgebreid uitslaan en afschrijven.

Deze cursus volgt op de cursus sectiebouw en afschrijven. De opleiding duurt 2 jaar en wordt eveneens gegeven door de Stichting Bemetel.

Meetcursus

Sinds vele jaren wordt door de Stichting Bemetel een meetcursus gegeven. Deze cursus omvat 20 lessen van elk 2 uur en strekt zich uit over 20 weken.
De cursus vindt plaats in het bedrijf dat de cursus heeft aangevraagd. De instructie geschiedt door speciaal hiervoor aangestelde Bemetel-consulenten. Deze beschikken over al het benodigde instructie- en oefenmateriaal.
In 1970 hoopt de Stichting Bemetel een vervolgmeetcursus te kunnen aanvangen.

Cursus fijnmechanische techniek

De cursus vindt plaats in samenwerking met de Nederlandse Vereniging voor Fijnmechanische Techniek (N.V.F.T.) te Utrecht. De duur is: 2 jaar, verdeeld over 50 avonden (van 19.00 tot 21.30 uur).
De plaats waar een cursus wordt gegeven is afhankelijk van de plaats van herkomst van de deelnemers.

Bijzondere cursussen

Vanaf 1968 werkt de Stichting Bemetel samen met de Stichting Bijzondere Cursussen (S.B.C.) te Alblasserdam aan een aantal cursussen in hydrauliek, pneumatiek, elektronica, enz.

1)	Documentatieblad Or/b-1	: Bestuur van de Stichting Bemetel
2)	Documentatieblad Or/s-1	: Statuten van de Stichting Bemetel
3)	Documentatieblad F/p-1	: Patroonsvergoeding
4)	Documentatieblad A/w-1	: Wet op het leerlingwezen
5)	Documentatieblad A/c-1	: Codelijst opleidingsberoepen
6)	Documentatieblad Ad/c-2	: Adreslijst consulenten
	Or/c-1	: Consulentencorps van de Stichting Bemetel
7)	Documentatiebladen groep H	: Leermiddelen
8)	Documentatieblad E/b-1	: Bemetelexamens

APPENDIX D

CORPS OF CONSULTANTS OF THE "STICHTING BEMETEL"

HOOFDCONSULENTEN

ing. A. C. Cheret
ing. H. Swaneveld
Ch. J. Z. van Swol

GROEPSCONSULENTEN

ing. W. Bennig
W. G. M. Boshoff (chef tekenkamer)
N. P. Nipius (schriftelijke examens)
ing. A. den Ouden
J. van der Poel
ing. N. van Vliet (Voortgezette Bemetel Opleidingen)
ing. H. J. Welsink
H. van de Weyer

WERKTUIGBOUW (NOORD)

Groepsconsulent: ing. H. J. Welsink

Consulenten:

ing. J. C. Bergman
ing. J. S. Dalman
ing. S. Keep
L. J. Kuhuwael
A. W. de Lange (sector lassen)
ing. J. de Leeuw
R. v. d. Maas
C. Smit
ing. A. van Soelen
C. Vet (sector kantoormachines)

WERKTUIGBOUW (ZUID)

Groepsconsulent: ing. W. Bennig

Consultenten:

W. M. van den Berg
ing. C. J. Dompeling
J. van Dijk
I. Haasdijk
Th. H. Hartman
A. v. d. Hoff
ing. H. F. M. Knaapen
ing. C. Th. A. van den Molengraft
ing. J. Scholly
G. van Zwienen

SCHEEPSBOUW

Groepsconsulent: J. van der Poel

Consulenten:

W. Buys
W. M. Hudepool
B. H. van der Jagt
S. P. L. Koudstaal
J. Rolloos
N. de Rooy
J. de Rouwe
H. Schoof
T. Terlouw
L. Valk

FIJNMETAAL EN MEETCURSUS

Groepsconsulent: H. van de Weyer

Consulenten:

A. H. Huysman
A. B. M. Jansen
H. de Vries
J. v. d. Werp
B. Zwiers
J. v. Huit (meetcursus)
J. Wijntje (meetcursus)

DIVERSE BEROEPEN

Groepsconsulent: ing. A. den Ouden

Consulenten:

N. J. Noorlander (gieterij)
M. G. W. Thurlings (modelmaken)
ing. B. W. A. Meijerman (meet- en regeltechniek)
E. J. Nobelen (meet- en regeltechniek)
A. de Bruin (graveren, goud- en zilversmeden)
E. de Haan (orthopedie)

Hiermede vervalt doc. blad Or/c-1/1 dd. 1-12-'69
Zie voor adressen doc. blad Ad/c-2/1

Ir. K. van der Pols (voorzitter), Buizenwerf 253, Rotterdam-16.	Metaalbond.
G. G. Maters (plaatsverv. voorzitter), Plein '40-'45 1, Amsterdam.	Industriebond N.V.V.
H. B. Baas, Machinefabriek Werkspoor-Amsterdam N.V. Oostenburgermiddenstraat 62, Amsterdam.	F.M.E.
Tj. Barkmeijer, N.V. Scheepswerf en machinefabriek, Hellingstraat 10, Stroobos.	Scheepsbouw Vereniging Hoogezand.
P. L. Berbée, Maliebaan 34, Utrecht.	Industriebond N.K.V.
S. S. Binnerts, Plein '40-'45 1, Amsterdam.	Industriebond N.V.V.
Ir. P. Boerstra, N.V. Lichtwerk, Edisonstraat 1, Hoogeveen.	Vereniging van Protestants Christelijke Metaalindustriën in Nederland.
Ir. D. Boterenbrood, Amsterdamse Droogdok Maatschappij, Meeuwenlaan 56, Amsterdam.	Metaalbond.
Drs. N. P. J. M. Daalderop, Donkerstraat 10 Heesselt (gem. Varik)	Katholieke Vereniging van Werkgevers in de Metaalindustrie
Ir. H. M. van Dantzig, N.V. Electrotechnische Industrie voorheen Willem Smit en Co., Slikkerveer.	Vereniging voor Fabrieken op Elektrotechnisch gebied in Nederland „Foegin".
C. ~~Jaarsma~~, ~~Nij~~enoord 2, Utrecht.	Christelijke Bedrijfsbond voor de Metaalnijverheid en Elektrotechnische Industrie.
Ir. F. van Kuyk, Bonifaciusstraat 37, Leidschendam.	F.M.E.
C. M. van Loon, Directeur Eerste Techn. School Madelaan 1, Delft.	Commissie Georganiseerd Schoolwezen Beroepsonderwijs.
Ir. H. van Mourik Broekman, Dr. Schaepmanlaan 5, Breda.	Metaalbond.
A. C. M. Nijkamp, N.V. Machinefabriek de Bruyn, Postbus 92, Enschede.	Katholieke Vereniging van Werkgevers in de Metaalindustrie.
Ir. L. M. C. Touw, Philips Gloeilampenfabrieken, afd. Sociale Zaken, Kastanjelaan 1, Eindhoven.	Vereniging voor Fabrieken op Elektrotechnisch gebied in Nederland „Foegin".
J. A. Wennink (penningmeester), Zonnebloemlaan 4, Aerdenhout.	Metaalbond en Commissie Georganiseerd Schoolwezen Beroepsonderwijs.

secretarissen: G. C. M. Hardebeck,
H. Pontier,
van Stolkweg 34, Den Haag.

APPENDIX E

CERTIFICATES OF COMPLETION

OF BEMETEL APPRENTICESHIP

DE STICHTING BEDRIJFSOPLEIDING METAAL- EN ELECTROTECHNISCHE INDUSTRIE „BEMETEL"

verstrekt deze cijferlijst aan

,

die na opleiding bij geboren

te

voor het examen in het beroep

op grond van de volgende cijfers is geslaagd.

(Voor het werkstuk is in de gearceerde kolom tevens het aantal tiende punten vermeld).

WERKBOEK	WERKSTUK		VAKLEER	TEKENING LEZEN	UITSLAAN

Leerlingnummer

N.B. Indien is vermeld:

30.40.50 betekent dit: Herexamen voor dit onderdeel (behaald cijfer + 0)

20 . . . . . . „ „ : Onderdeel nog af te leggen.

21 . . . . . . „ „ : Onderdeel niet van toepassing.

44 . . . . . . „ „ : Vrijstelling voor dit onderdeel.

Den Haag,

Aldus gewaarmerkt:

DE STICHTING BEDRIJFSOPLEIDING METAAL- EN
ELECTROTECHNISCHE INDUSTRIE „BEMETEL"

verstrekt deze cijferlijst aan

die na opleiding bij geboren

te

voor het examen in het beroep

op grond van de volgende cijfers
is geslaagd.

(Voor het werkstuk is in de gearceerde kolom tevens het [illegible]

	A	B	C	D	E	F	G	H	I
WERKBOEK	WERKSTUK	CONSTRUCTIE-LEER	ANATOMIE EN BEWEGINGSLEER	PATHOLOGIE ORTHOPEDIE	MATERIAAL EN GER.SCH.LEER				

N.B. Indien is vermeld:

30 40.50 betekent dit: Herexamen voor dit onderdeel [illegible]

20 „ „ Onderdeel nog af te leggen.

22 „ „ Onderdeel niet van toepassing. Den Haag,

44 „ „ Vrijstelling voor dit onderdeel.

DE STICHTING BEDRIJFSOPLEIDING METAAL- EN
ELECTROTECHNISCHE INDUSTRIE „BEMETEL"

verstrekt deze cijferlijst aan

die na opleiding bij geboren

te

voor het examen in het beroep

op grond van de volgende cijfers
is geslaagd.

(Voor het werkstuk is in de gearceerde kolom tevens het aantal tiende punten vermeld.)

TAKENBOEK	A	B INSTRUMENTEN-KENNIS	C TEMPERATUUR-METINGEN	D ELEKTROLEER	E AFSTANDS-METINGEN	F REGELTECHNIEK	G VOLUME- EN STROOMSTERKTE-METINGEN	H INSTR.TAAK ELEKTRISCH	I INSTR.TAAK NIET ELEKTR.

[illegible]nummer

N.B. Indien is vermeld:

30.40 50 betekent dit: Herexamen voor dit onderdeel [illegible]
20 . . . . ,, ,, . Onderdeel nog af te leggen.
21 . . . . ,, ,, . Onderdeel niet van toepassing. [illegible]
44 . . . . ,, ,, Vrijstelling voor dit onderdeel.

[illegible]

DE STICHTING BEDRIJFSOPLEIDING METAAL- EN
ELECTROTECHNISCHE INDUSTRIE „BEMETEL"

verstrekt deze cijferlijst aan

die na opleiding bij geboren

te

voor het examen in het beroep

op grond van de volgende cijfers
is geslaagd.

(Voor het werkstuk is in de gearceerde kolom tevens het aantal tiende punten vermeld.)

	A	B	C	D	E	F	G	H	I
TAKENBOEK	WERKSTUK	VAKLEER	TEKENING-LEZEN	ENGELS	VLIEGTUIG-SYSTEMEN	VLIEGTUIG-MONTAGE	VOORTSTUWING STRAALMOTOREN	VOORTSTUWING ZUIGERMOTOREN	ELEKTRO-TECHNIEK

Leerlingnummer

N.B. Indien is vermeld:
30.40.50 betekent dit: Herexamen voor dit onderdeel (behaald cijfer + 0
20 . . . . . ,, ,, : Onderdeel nog af te leggen.
21 . . . . . ,, ,, : Onderdeel niet van toepassing.
44 . . . . . ,, ,, : Vrijstelling voor dit onderdeel

Den Haag,

Aldus gewaarmerkt

APPENDIX F

EXAMPLES OF AWARDING MARKS

DIRECTIVES FOR THE EXAMINATION BOARDS

STICHTING BEDRIJFSOPLEIDING
METAAL- EN ELECTROTECHNISCHE INDUSTRIE
"BEMETEL" DEN HAAG

EXAMPLES OF THE AWARDING OF MARKS

DIRECTIVES FOR THE EXAMINATION BOARDS FOR THE DETERMINATION OF THE FINAL MARKS.

The A-examination comprises: one or more practical tests
one or more craft theoretical subjects.

PRACTICAL TESTS:

1. testpiece
2. assembly for maintenance crafts
3. development for thin plate working
4. section building in shipbuilding
5. runner-technique for handmoulders

The final marks for the practical tests must be 6 or higher to pass for the examination. The provisional mark 5,9 - 6 is rounded to the final mark 6. The final marks higher than 6,0 for the practical tests 1 and 4 are rounded to one decimal place.

Exception: In case the calculated provisional testpiece mark is found to be 5,80 - 5,89 inclusive, the examination board may decide to raise this mark to 6,0 when the quality mark proves to be a distinct 6, but that this mark has been lowered from 5,80 - 5,89 inclusive due to the time correction.

CRAFT THEORETICAL SUBJECTS

A. Vocations with two craft theoretical subjects.

For the determination of the final marks for the subjects craft theory and engineering drawing reading, the following rules apply:

1. The sum of the two provisional marks must be at least 11,0 in order to pass.
2. When the provisional mark gained for craft theory is lower than 4,0, re-examination is required, regardless the sum of the marks for the subjects involved.
Engineering drawing reading requires at least a provisional mark of 5,0.
3. When re-examination is required for one of the subjects (lower than 4,0 or 5,0), re-examination is also required for the second subject if the mark awarded is lower than 6,0.
4. When it is determined that re-examination is required for the testpiece, re-examination will also be required for those subjects which have been awarded a provisional mark lower than 5,0.
5. When the testpiece has yet to be made, re-examination shall also be required for the subject awarded a provisional mark lower than 5,0.
6. When the testpiece has yet to be made, re-examination may also be required in case both subjects have been awarded a provisional mark lower than 6,0.
7. Observant to rules 1 to 6 inclusive, the following standards should be adhered to in rounding the provisional marks of the two subjects.

4,5 upward = 5	7,5 upward = 8
5,5 upward = 6	8,5 upward = 9
6,5 upward = 7	9,5 upward = 10

B. Vocations with three craft theoretical subjects.

For the determination of the final marks for the subjects craft theory and engineering drawing reading and developing, the following rules apply:

1. The sum of the three provisional marks must be at least 16,5 in order to pass.
2. When the provisional mark gained for craft theory and/or developing is lower than 4,0, re-examination is required, regardless the sum of the marks for the subjects involved. Engineering drawing reading requires at least a provisional mark of 5,0.
3. When re-examination is required for one of the subjects (lower than 4,0 or 5,0), re-examination may also required for those subjects awarded a mark lower than 6,0.
4. When it is determined that re-examination is required for the testpiece, re-examination will also be required for those subjects which have been awarded a provisional mark lower than 5,0.
5. When the testpiece has yet to be made, re-examination shall also be required for the subject awarded a provisional mark lower than 5,0.
6. When the testpiece has yet to be made, re-examination may also be required in case two of the subjects have been awarded a provisional mark lower than 6,0.
7. Observant to rules 1 to 6 inclusive, the following standards should be adhered to in rounding the provisional marks of the two subjects.

4,5 upward = 5	7,5 upward = 8
5,5 upward = 6	8,5 upward = 9
6,5 upward = 7	9,5 upward = 10

Examples for the vocations with two craft theoretical subjects.
1. Craft theory
2. Engineering drawing reading

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 5,9	6,0	Testpiece : 5,8	Re-exam.5,0
Craft theory : 4,4	4	Craft theory : 4,9	Re-exam.50
Drg. reading : 6,6	7	Drg. reading : 6,1	6
Sum : 11,0		Sum : 11,0	
Testpiece : 6,0	6,0	Testpiece : yet	yet
Craft theory : 5,5	6	Craft theory : 4,9	Re-exam.50
Drg. reading : 5,5	6	Drg. reading : 6,1	6
Sum : 11,0		Sum : 11,0	
Testpiece : 6,5	6,5	Testpiece : 6,5	6,5
Craft theory : 6,0	6	Craft theory : 6,6	7
Drg. reading : 5,0	5	Drg. reading : 4,9	Re-exam.50
Sum : 11,0		Sum : 11,5	
Testpiece : 7,0	7,0	Testpiece : 7,0	7,0
Craft theory : 5,6	6	Craft theory : 5,4	Re-exam.50
Drg. reading : 5,4	5	Drg. reading : 5,0	Re-exam.50
Sum : 11,0		Sum : 10,4	
Testpiece : 7,0	7,0	Testpiece : 7,0	7,0
Craft theory : 5,5	6	Craft theory : 5,4	Re-exam.50
Drg. reading : EXEMPT.	EXEMPT.	Drg. reading: EXEMPT.	EXEMPT.

Examples for the vocations with three craft theoretical subjects.
1. Craft theory
2. Engineering drawing reading
3. Developing

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 7,1	7,1	Testpiece : 5,7	Re-exam.50
Craft theory : 4,0	4	Craft theory : 4,6	Re-exam.50
Drg. reading : 5,0	5	Drg. reading : 5,0	5
Developing : 7,5	8	Developing : 6,9	7
Sum :16,5		Sum :16,5	
Testpiece : 7,2	7,2	Testpiece : 7,2	7,2
Craft theory : 5,9	6	Craft theory : 5,9	6
Drg. reading : 5,0	5	Drg. reading : 4,7	Re-exam.50
Developing : 5,9	6	Developing : 5,9	6
Sum :16,8		Sum :16,5	
Testpiece : 7,3	7,3	Testpiece : 7,3	7,3
Craft theory : 5,9	6	Craft theory : 5,0	Re-exam.50
Drg. reading : 5,4	5	Drg. reading : 5,0	Re-exam.50
Developing : 5,2	5	Developing : 6,0	6
Sum :16,5		Sum :16,0	
Testpiece : 7,4	7,4	Testpiece : 7,4	7,4
Craft theory : 5,5	6	Craft theory : 3,6	Re-exam.40
Drg. reading : 5,5	6	Drg. reading : 4,7	Re-exam.50
Developing : 5,5	6	Developing : 8,2	8
Sum :16,5		Sum :16,5	

Examples for the vocation Metal working in Shipbuilding.

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 5,9	6,0	Testpiece : 5,7	Re-exam.50
Developing & marking off: 6,5	7	Developing & marking off: 5,3	Re-exam.50
Craft theory : 6,6	7	Craft theory : 6,3	6
Drg. reading : 5,0	5	Drg. reading : 4,9	Re-exam.50
Sum :18,1		Sum :16,5	
Testpiece : 6,0	6,0	Testpiece : 6,5	6,5
Developing & marking off: 5,5	6	Developing & marking off: 5,4	Re-exam.50
Craft theory : 5,5	6	Craft theory : 6,6	7
Drg.reading : 5,5	6	Drg. reading : 4,6	Re-exam.50
Sum :16,5		Sum :16,6	

Restriction: The provisional mark for developing and marking off for the vocation of metal working in Shipbuilding must be at least 5,5 to pass for the examination.

Examples for the vocation Section Building & Marking off in Shipbuilding.

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Developing & marking off: 5,9	6,0	Developing & marking off: 5,8	Re-exam.50
Craft theory : 5,5	6	Craft theory : 6,2	6
Developing & marking off: 6,5	6,5	Developing & marking off: 7,45	7,5
Craft theory : 6,5	7	Craft theory : 5,4	Re-exam.50

Examples for thin plate working vocations.

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 5,9	6,0	Testpiece : 5,7	Re-exam.50
Developing : 5,9	6	Developing : 6,6	7
Craft theory : 6,0	6	Craft theory : 4,4	Re-exam.40
Drg. reading : 5,1	5	Drg. reading : 6,6	7
Sum :17,0		Sum :17,6	
Testpiece : 6,0	6,0	Testpiece : 6,0	6,0
Developing : 6,6	7	Developing : 5,8	Re-exam.50
Craft theory : 4,0	4	Craft theory : 7,2	7
Drg. reading : 7,0	7	Drg. reading : 4,4	Re-exam.40
Sum :17,6		Sum :17,4	

Restriction: The provisional mark for developing as a subject of thin plate working vocations, must be at least 5,9 to pass for the examination.

Example for the vocation Patternmaking.

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 6,5	6,5	Testpiece : 7,2	7,2
Work preparation : 5,5	6	Work preparation : 5,4	Re-exam.50
Craft theory : 5,5	6	Craft theory : 6,1	6
Sum :11,0		Sum :11,5	

Restriction: The provisional mark for work preparation as a subject of the vocation handmoulding, must be at least 5,5 to pass for the examination.

Examples for the vocation Handmoulding.

PASSED		FAILED	
Marks gained	Final marks	Marks gained	Final marks
Testpiece : 8,6	8,6	Testpiece : 8,1	8,1
Runner making technique : 5,9	6	Runner making technique : 5,8	Re-exam.50
Craft theory : 4,0	4	Craft theory : 4,9	5
Drg. reading : 7,0	7	Drg. reading : 6,1	6
Sum :16,9		Sum :16,8	
Testpiece : 8,0	8,0	Testpiece : 8,0	8,0
Runner making technique : 5,9	6	Runner making technique : 5,8	Re-exam.50
Craft theory : 6,2	6	Craft theory : 6,3	6
Drg. reading : 7,4	7	Drg. reading : 4,9	Re-exam.50
Sum :19,5		Sum :17,0	

Restriction: The provisional mark for runner making technique as a subject of handmoulding, must be at least 5,9 to pass for the examination.

N.B. The examination boards reserve the right to deviate from these rules on account of particular circumstances in border cases.

APPENDIX G

EVALUATION OF THE PRACTICAL EXAMINATION

STICHTING BEDRIJFSOPLEIDING METAAL- EN ELECTROTECHNISCHE INDUSTRIE „BEMETEL”

VAN ... • DEN HAAG • TEL. 070-512391

Evaluation of the practical examination (amended 1972)

The final evaluation of the practical testpiece is expressed in two marks on the marks list of the certificate.

The first mark refers to the quality of the testpiece.
The second mark represents the evaluation of the time worked.

The quality mark.

Calculation.

A maximum number of points to be gained is established by the Examination Board.

The number of points gained by the candidate for the testpiece is divided by the maximum number of points.
This division gives a percentage and is converted into the marks progression 1 - 10 as follows:

97 - 100 incl.	= 10	63 - 65 incl.	= 5
94 - 96	= 9,5	60 - 62	= 4,5
90 - 93	= 9	57 - 59	= 4
86 - 89	= 8,5	54 - 56	= 3,5
82 - 85	= 8	51 - 53	= 3
79 - 81	= 7,5		
75 - 78	= 7	48 - 50	= 2,5
72 - 74	= 6,5	45 - 47	= 2
69 - 71	= 6	42 - 44	= 1,5
66 - 68	= 5,5	39 - 41	= 1

In order to pass (irrespective of the candidate's mark for time) a mark of 6 must be obtained.
In case the percentage obtained by the candidate lies between 66 and 68, the examination result is considered by the Board and the mark <u>may</u> be raised to the final mark of 6.

Important considerations for this decision are the time mark (minimum 7, see time calculation), the progress of the examination and the mark for the workbook.

The time mark.

Beside the set working time, established by the Board, the candidate is given a period of time in which it is assumed feasible to finish the testpiece.
This period of time is either shorter or longer than the set working time.
When the candidate finishes his testpiece in the given period of time, he is awarded a time mark of 7.
Longer or shorter work will reduce or raise the time mark according to the tables given.
In case the mean working time (i.e. the sum of the individual times of all candidates to finish the same testpiece divided by the number of candidates) deviates substantially from the set working time, the Board <u>may</u> decide to increase the working time, which also implies an increase of the period of time.
Once a working time or a time period has been established it can never be <u>reduced</u>.

Turn to page 2.

Set working time in hours	Time period
20 - 29 incl.	+2 hrs. -1 hr.
30 - 39 incl.	+3 hrs. -2 hrs.
40 - 49 incl.	+4 hrs. -3 hrs.

A higher or lower mark than 7 is calculated according to the tables below.

For longer work (exceeding the set time period)

Set working time in hours	Excess hours	Subtraction
20 - 29 incl.	1 - 3 incl.	1 point
30 - 39 incl.	1 - 4 incl.	1 point
40 - 49 incl.	1 - 5 incl.	1 point
20 - 29 incl.	4 - 6 incl.	2 points
30 - 39 incl.	5 - 8 incl.	2 points
40 - 49 incl.	6 -10 incl.	2 points
20 - 29 incl.	7 - 9 incl.	3 points
30 - 39 incl.	9 -12 incl.	3 points
40 - 49 incl.	11 -15 incl.	3 points
20 - 29 incl.	10 -12 incl.	4 points
30 - 39 incl.	13 -16 incl.	4 points
40 - 49 incl.	16 -20 incl.	4 points

For the practical testpiece the general rule applies, that continuation of the examination may be stopped by the supervisor in charge when the candidate exceeds the set working time by more than approximately 35%. As a consequence a time mark less than 4 is usually not awarded.

For shorter work (less than the set time period)

Set working time in hours	Lesser hours	Addition
20 - 29 incl.	1 - 2 incl.	1 point
30 - 39 incl.	1 - 3 incl.	1 point
40 - 49 incl.	1 - 4 incl.	1 point
20 - 29 incl.	3 - 4 incl.	2 points
30 - 39 incl.	4 - 6 incl.	2 points
40 - 49 incl.	5 - 8 incl.	2 points
20 - 29 incl.	5 - 6 incl.	3 points
30 - 39 incl.	7 - 9 incl.	3 points
40 - 49 incl.	9 -12 incl.	3 points

Candidates having a time mark less than 5 have to take a re-examination on the testpiece, irrespective of the quality mark.

The same applies to candidates having the quality marks 6 and 6,5 but a time mark less than 6.

Turn to page 3.

The quality mark.

This mark is given in the progression of 1 - 10 (as in the table). Examination results lying between 66% and 68% are discussed by the Board, the final mark may be raised to 6.

An O following an insuffcient mark on the marks list issued, signifies that a re-examination has to be taken on the testpiece.

The time mark.

The time mark is also given in the progression 1 - 10, generally at a minimum of 4.
A mark of 7 is employed as a base if the testpiece is finished within the time period laid down in the tables.
This time period may be increased when the set time proves to deviate substantially from the mean time.
Irrespective of the quality mark, re-examination has to be taken when a time mark of 4 is acquired.

Re-examination must also be taken for quality marks 6,5 and 6 accompanied by a time mark of 5.
An O following the examination mark gained, indicates a re-examination.

Examination results

Marks to be gained to pass:

Quality	Time
6	6 - 10 incl.
6,5	6 - 10 incl.
7	5 - 10 incl.
7.5	5 - 10 incl.
8	5 - 10 incl.
8,5	5 - 10 incl.
9	5 - 10 incl.
9,5	5 - 10 incl.
10	5 - 10 incl.

Re-examination marks:

Quality	Time
5,5	6 - 10 incl.
6	5
6,5	5
7	4 - 1 incl.
7,5	4 - 1 incl.
8	4 - 1 incl.
8,5	4 - 1 incl.
9	4 - 1 incl.
9,5	4 - 1 incl.
10	

-o-o-o-o-o-o-

APPENDIX H

"BRACKET" BEMETEL EXAMINATION SAMPLE

STICHTING BEDRIJFSOPLEIDING METAAL-
EN ELECTROTECHNISCHE INDUSTRIE „BEMETEL"

van Stolkweg 34 DEN HAAG Tel.: 512391

Bemetel-examination 1973 Candidate's nr...............

Drawing nr.1000-T35-11 BRACKET
Drawing nr.1000-T35-24
Drawing nr.1000-T35-34 SET TIME: 3 hours
Drawing nr.1000-T35-44
Question sheet nr.1000-035-14

ENGINEERING DRAWING READING/SKETCHING

Professions:

Fitting & plating	Handfitting
Aircraft eng.fitting & plating	Hand & machine fitting
Electromech. fitting	Diemaking
Turning (turret lathe)	Electromech.devices eng.
Turning/Small turning	Patternmaking (wood)
Milling/Small milling	Patternmaking (metal)
Precision fitting	Formgrinding
Fine mech.engineering	Shaping
Toolmaking	Press toolfitting
Instrumentmaking	Press toolmaking
Boring	Aircraft component patternmaking
Plastics working (aircraft eng.)	Aircraft maintenance mechanic
Lift maintenance	Universal grinding

ENTER: 1. Your candidate's number in the right upper corner.
2. The answers on the dotted lines.

Check the answers before handing in your papers.
Hand in the relevant drawing as well.

Study the drawing first, then answer the questions.
Show the calculation in entering the dimensions, e.g. 50 - 3 = 47.

GENERAL:

1. a. Indicate by a fat line on sheet nr.1000-T35-24, which shows the front elevation, how the section line of section I-I runs.
   b. Provide both ends of the section line with arrowheads giving the direction in which section I-I is seen. Mark the arrowheads I.

L.H. SIDE ELEVATION:

2. Dimension A is: Answer 2 : ....

3. Dimension B is: Answer 3 : ....

4. Dimension C is: Answer 4 : ....

5. Face D is represented in the front elevation by the line marked with the number: Answer 5 : ....

6. Dimension E is: Answer 6 : ....

Drawing nr.1000-T35-11
Drawing nr.1000-T35-24
Drawing nr.1000-T35-34
Drawing nr.1000-T35-44
Question sheet nr.1000-035-14

FRONT ELEVATION:

7. In the specification of surface finish $\overset{63}{\bigtriangledown}$, what is the significance of the number 63? Answer 7 : ....

8. In the indication

◎	Ø 0,05	B

what is the significance of:

a. ◎ ? Answer 8a:..................

b. Ø 0,05? Answer 8b:..................

c. B? Answer 8c:..................

9. Dimension F is: Answer 9 :..................

10. Line G is represented in section I-I by the plane marked with the number. Answer 10 : ....

SECTION I-I:

11. Dimension H is: Answer 11 : ....

12. Dimension J is: Answer 12 : ....

13. Dimension K is: Answer 13 : ....

R.H. SIDE ELEVATION:

14. Face L is represented in the plan by the line marked with the number: Answer 14 : ....

15. Dimension M is: Answer 15 : ....

PLAN:

16. Line N is represented in the L.H. side elevation by the plane marked with the number: Answer 16 : ....

17. What is the thickness R? Answer 17 : ....

18. Face T is represented in the L.H. side elevation by the line marked with te number: Answer 18 : ....

Drawing nr.1000-T35-11
Drawing nr.1000-T35-24
Drawing nr.1000-T35-34
Drawing nr.1000-T35-44
Question sheet nr.1000-035-14

19. DIMENSIONING:

On the answer sheet nr.1000-T35-34 two elevations are given of a forked end. Enter the dimensions necessary to manufacture this component. Dimension lines should be efficiently positioned with a view to machining.
Dimensions may be measured from the drawing.

20. SECTION DRAWING:

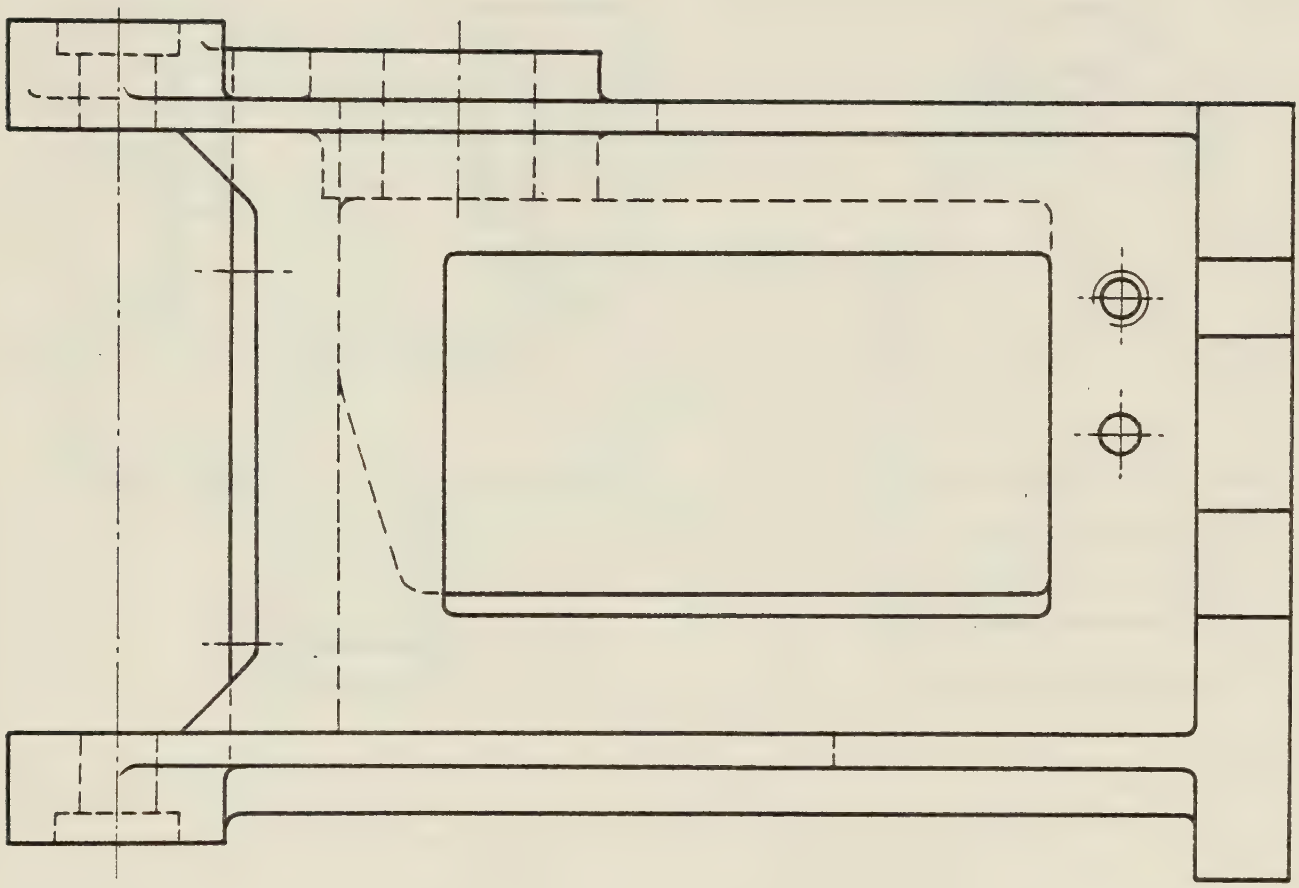
Make a full scale drawing (sketch) on answer sheet nr.1000-T35-44 of the section indicated by the section line II-II, seen in the direction of the arrows. Do not enter dimensions.

Only the visible outlines need be drawn.
Compasses, set-squares and scale are permitted to be used.
A T-square is not to be employed.

-o-o-o-o-o-o-

CANDIDATE'S NUMBER 159

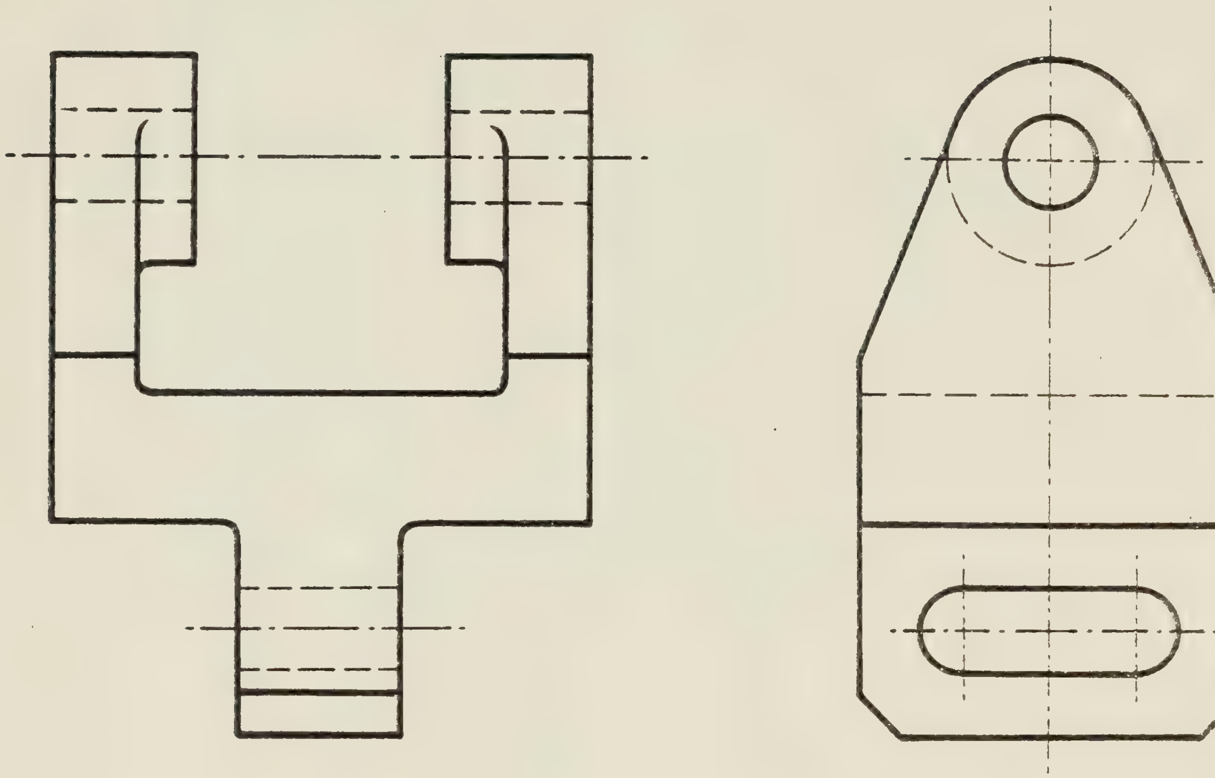
FRONT ELEVATION



PROF: ENG. DRAWING READING/ SKETCHING	
QUESTION 1	
EXAM: 1973	SCALE: 1:
Nº 1000-T35-24	Nº OF SHEE 4

STIGHTING REMETEL

CANDIDATE'S NUMBER 160



FORKED END

PROF: ENG. DRAWING READING/ SKETCHING

QUESTION 19

EXAM: 1973

SCALE: 1:

N° 1000–T35–34

N° OF SHEE 4

CANDIDATE'S NUMBER 161

BRACKET	
PROF: ENG. DRAWING READING/ SKETCHING	
QUESTION 20	
EXAM: 1973	SCALE: 1:
Nº 1000 – T35 – 44	Nº OF SHEE 4
STICHTING "BEMETEL"	

APPENDIX J

"WIRE SHEARS" BEMETEL EXAMINATION SAMPLE

van Stolkweg 34 DEN HAAG Tel.: 512391

PROFESSION: HANDFITTING BEMETEL-EXAMINATION 1973
PROFESSION NR.300

The following points have to be observed by the candidate:

1. use one sheet for answering one question only;
2. mention the trade on each answering sheet;
2. write the number of the question in the middle of each sheet;
4. write the candidates number in the right upper corner.

Do not repeat the question.
The questions need not be answered in the given sequence.
Think well. Write clearly and without errors.

SET TIME: 2½ hours

IMPORTANT

EXAMINE THE ENCLOSED DRAWING OF THE WIRE SHEARS FIRST.

ALL QUESTIONS EXCEPT NR.11 RELATE TO THIS WIRE SHEARS.

Turn to page 2

Question 1.

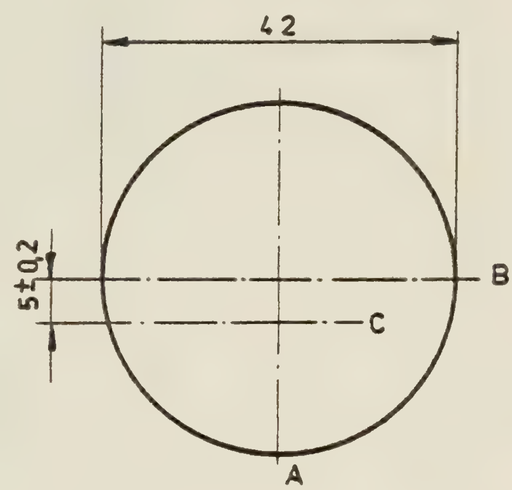
Various types of hand shears and cutting machines are used for cutting operations in metal working.

a. Name a number of materials which can be cut by means of the above tools.
b. Name two different types of hand shears and two types of cutting machines.
c. Name two advantages and two disadvantages of cutting. K15314

Question 2.

Part nr.10 has been premachined to Ø 42 x 62±0,2.
The centres of both end faces have to be marked out as shown on the drawing.

a. What tools do you need for marking out?
b. Describe the procedure of marking out the centres, step by step in the proper sequence.
   The centre lines are denoted A, B and C in the drawing.



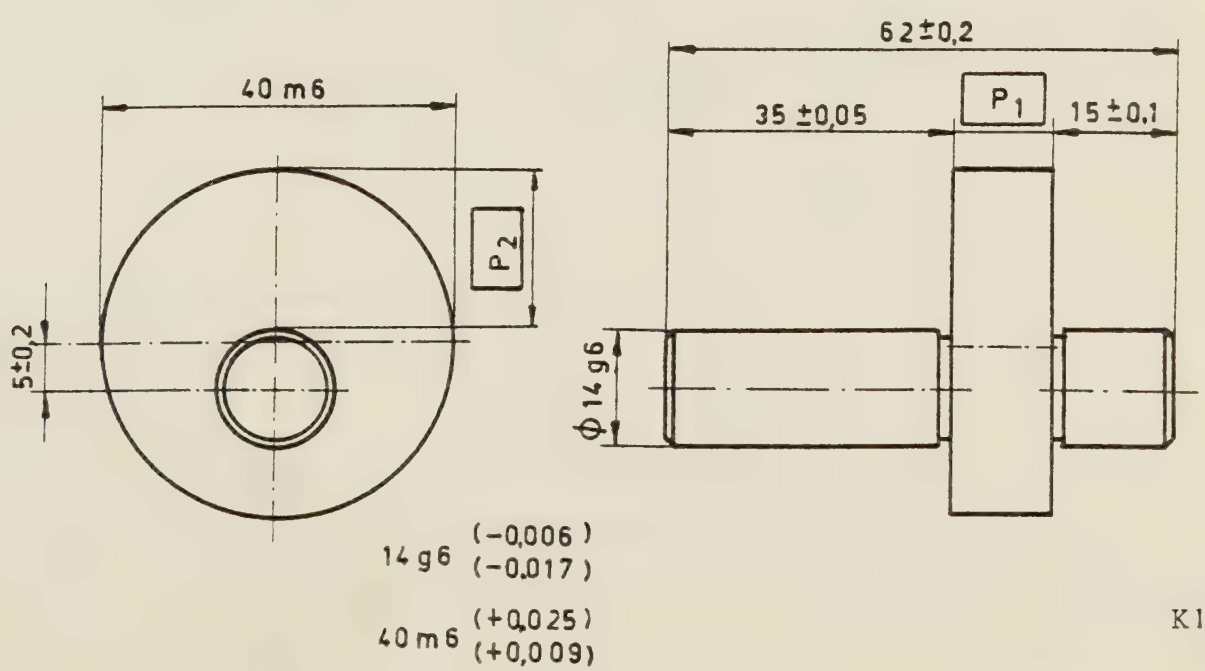
K15185

Question 3.

Calculate from the drawing below.

a. The maximum and the minimum value of P_1.
b. Same for P_2.

Show the entire calculation on the answer sheet.



K15186

Turn to page 3

Question 4.

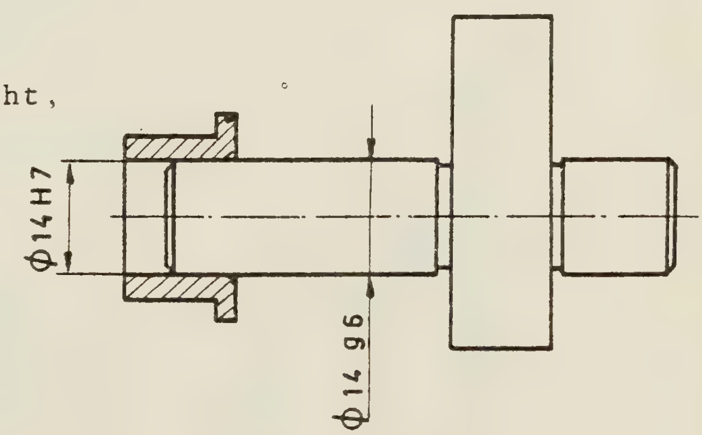
The desired properties of steels are obtained by alloying with metals and/or non-metals. The alloying elements chromium, carbon, lead, manganese and vanadium are listed in the table below. Each of these elements has a certain influence upon properties like tensile strength, elongation, etc.
As an example chromium may either increase(+) or reduce(-) the properties listed, or even have no influence at all(0).
Copy the table below and enter the proper sign, indicating the influence of the alloying element upon the properties.

PROPERTIES / NAME OF THE ELEMENT	TENSILE	ELONGATION	TOUGHNESS	HARDNESS	MACHINABILITY	WAER RESISTANCE	CORROSION RESISTANCE
CHROMIUM							
CARBON							
LEAD							
MANGANESE							
VANADIUM							

K15316

Question 5.

As shown on the drawing at right, part 10 and 8 are specified to have an ISO-fit Ø 14 H7/g6.



a. What is designated by:
   1. the number 14;
   2. the capital letter H;
   3. the suffix number 7?

b. Copy and complete the following sentences:
   1. the nominal size of 14 g6 is .... mm;
   2. the low limit is .... mm;
   3. the high limit is .... mm;
   4. the tolerance is .... mm.

c. Calculate the largest and the smallest clearance of the fit Ø 14 H7/g6.

d. Explain why the fit H7/m6 has <u>not</u> been specified in this case.

K15317

Turn to page 4

Question 6.

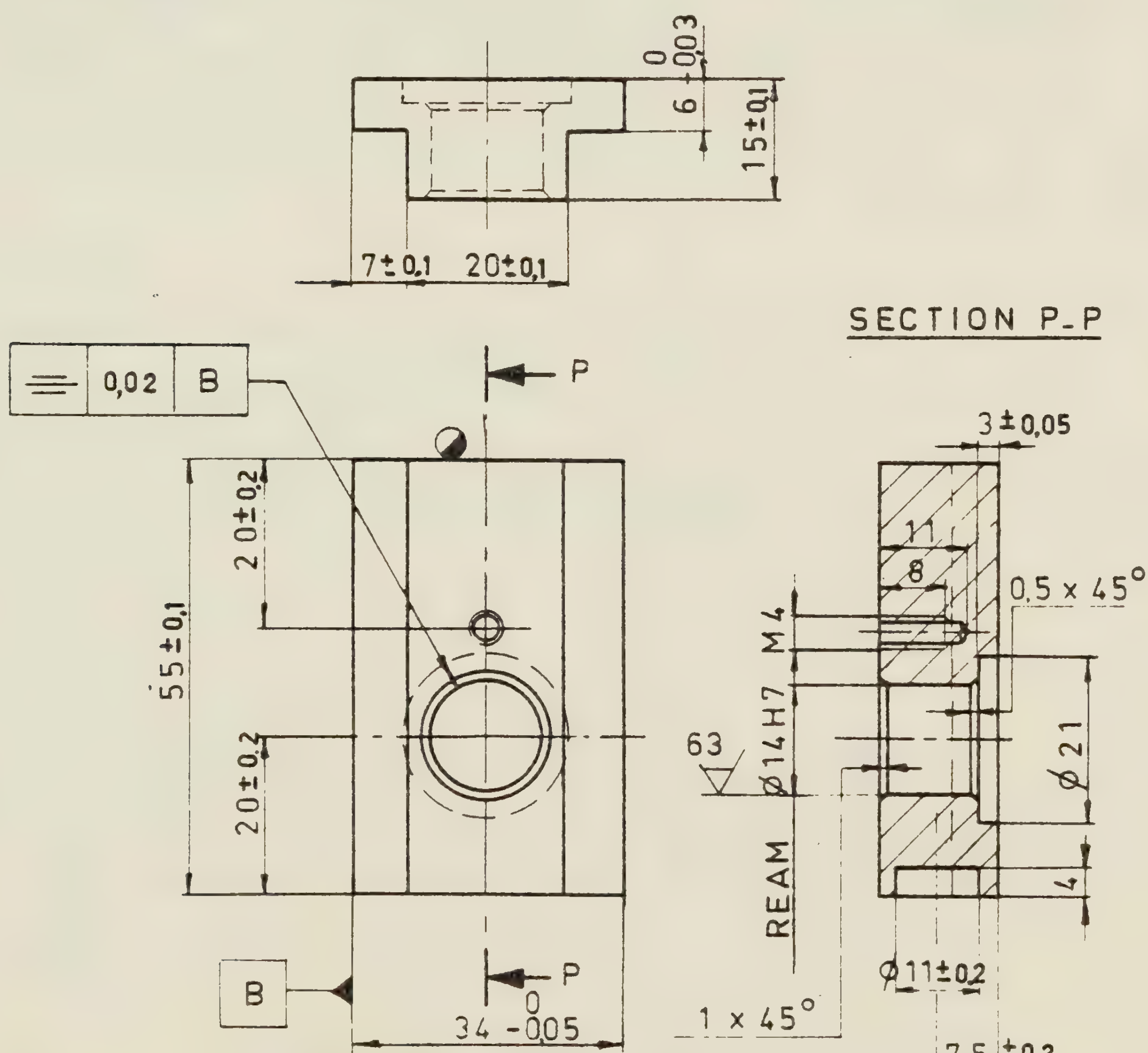
a. What material is part 11 made of?
b. Name the elements which this material is composed of.
c. Give the percentages of the composition. K15318

Question 7.

The cutterholder shown below (part 4) has to be checked on the following items:

a. length 55±0,1
b. width $34^{\;0}_{-0,05}$
c. depth 3,0
d. bore dia 14 H7
e. symmetry ⌯ 0,02 B

Name the measuring instruments which are necessary for measuring/inspection of the items under a, b, c, d and e and add the required accuracy to which each of these instruments should read.



TOLERANCE ±0,5 UNLESS OTHERWISE SPECIFIED

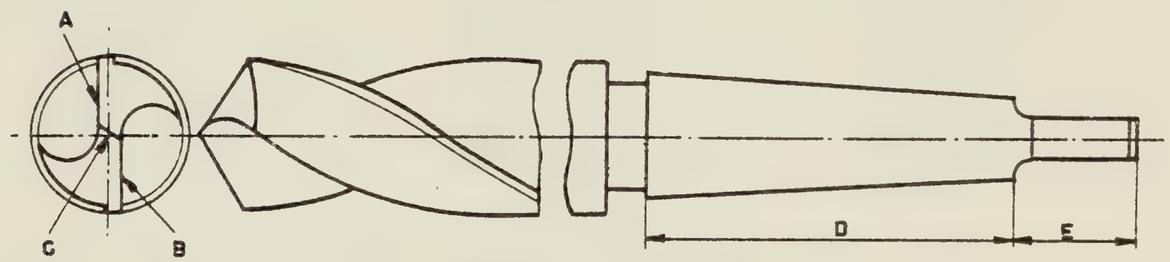
K15319

Turn to page 5

Question 8.

The twist drill of 19,5 mm diameter shown below is used for drilling the bores Ø 20 H7 in parts 2 and 3, which are to be reamed.

a. Denominate the lines marked A, B and C.
b. What is the name of the parts D and E?
c. What is part E for?
d. How many revolutions per minute should this drill make when the cutting rate for this material has to be 30 metres/minute?
   Show the entire calculation on the answer sheet.
   Decimals are not required.



K15320

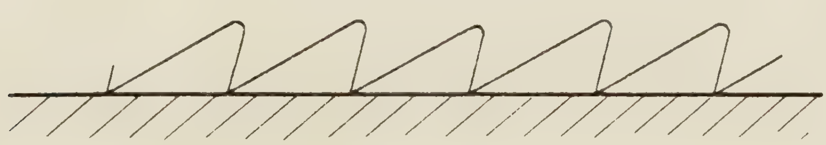
Question 9.

The cylindrical part $\varnothing\ 11^{\ 0}_{-0,05}$ of part 7,
has to fit into the corresponding hole of part 6 which has a diameter of $11 \pm 0,1$.

a. Show the incorrectness of dimensioning by calculating the largest and the smallest clearance.
b. Give a better shaft/hole association for this assembly. K15321

Question 10.

a. Name four grades of cut of hand files.
b. What difference is there between a cut file and a milled file with regard to the rake angle?
c. The drawing below shows the enlarged teeth of a file.
   1. Copy the drawing on the answer sheet and indicate the rake angle, the wedge angle and the clearance angle.
   2. What is the sum of these angles?

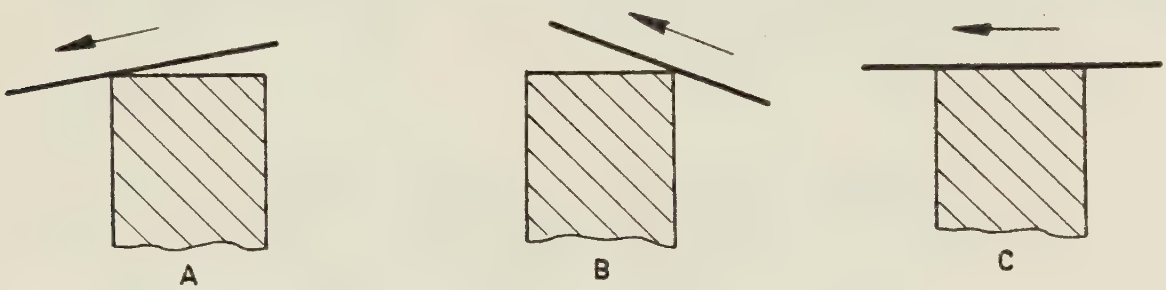


K15322

Turn to page 6

Question 11.

a. What is the purpose of setting the teeth of a hacksaw blade? Make a sketch of an enlarged section across a hacksaw blade with set teeth, positioned in the groove it has cut.
b. Why doesn't a hacksaw blade have a uniform hardness?
c. Which part is hardest and why?
d. Why is it that band saws and circular saws work faster than a power driven hacksaw?
e. Three possibilities of commencing to saw with a hacksaw are given below.

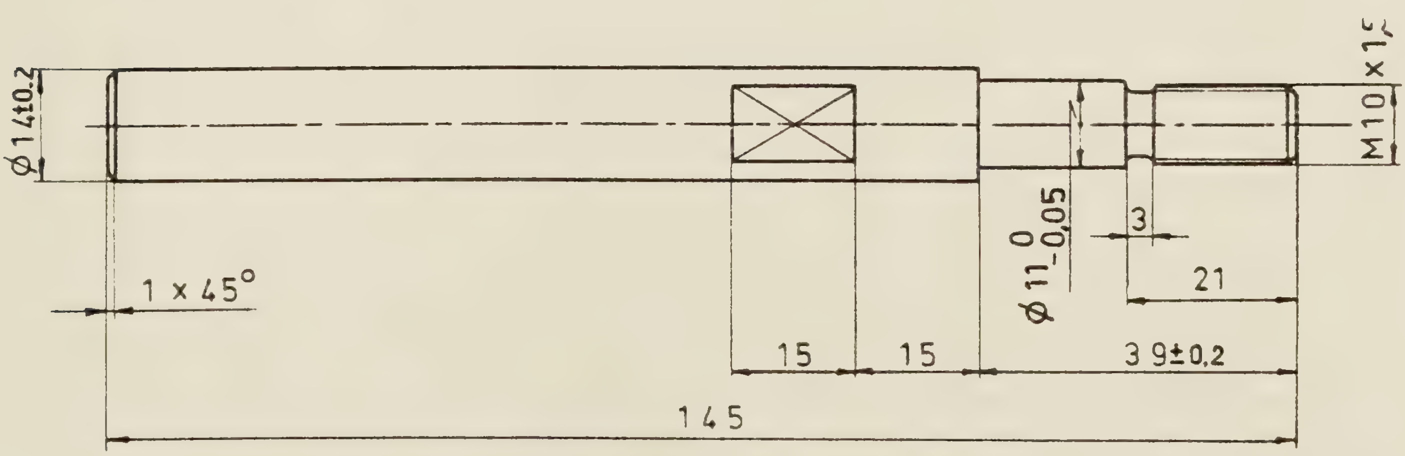


1. Which is the correct method and why?
2. Explain why the other two methods are incorrect. K15323

Question 12.

The lever (part 7) shown below has a thread M10 x 1,5 at one end.

a. In the designation M10 x 1,5, what is represented by M, 10 and 1,5?
b. If this thread is to be cut with a solid M10 button die, to what diameter should the threaded end be machined prior to screw cutting? Explain why.
c. When do we use a split button die or half dies?
d. After screw cutting the thread proves to be of bad quality. The die is found to be in good condition. Name three causes which may have led to this result.



K15324

Turn to page 7

Quesion 13.

A press fit (Ø 20 H7/m6) has been specified for the assembly of parts nr.8 and parts 2 and 3.

a. In a press fit, what typical fact is noticeable with regard to the size of the inner member (the shaft) and the size of the part into which it has to fit (the hole)?
b. Why is it important to provide the bearing bushes with a lead edge prior to pressing them home?
c. What determines the quality of a press fit connection?
d. In a press fit, what happens if the size of the shaft has been too large relative to the hole size?
   And what would be the result if the size of the shaft has been machined too small relative to the hole size? K15325

Question 14.

The bottom surface of part 1 has to be scraped.

a. What type of scraper is to be used?
b. 1. Sketch this scraper in its correct position relative to the surface to be scraped.
   2. Indicate the clearance angle, the rake angle and the wedge angle.
c. What is the purpose of scraping? Formulate the answer in three points. K15326

Question 15.

a. Name three safety measures to be taken for personal safety prior to operating a drilling machine.
b. Why does an incorrectly ground drill promote unsafe working? K15327

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APPENDIX K

LOCATIONS OF THE VISITS

VISITS

Location	Authority Interviewed
The Hague	- The Director - The Adjunct Secretary - The Chief Consultant and the Consultant, Advanced Programs of the Bemetel Foundation
Amsterdam	- The Chief Engineer of Werkspoor N.V. (Manufacturer of locomotives and rolling stock) - The Director of the (Stichting) Hout Foundation - The Chairman of the Metal Workers Union
Rotterdam	- The Business Agent of the Electrical Workers Union - The Director of a Drydock Company (R.D.M.)
Utrecht	- The Information Officer of the (Stichting) Bouwbedrijf Foundation - The Chairman of the Christian Workers Union
Tilburg	- The Personnel Officer of the Nederlandse Spoorwegen (State Railroad System)
Mierlo	- Staff and trainees at the "Apprentice-Village and Training Centre"

APPENDIX L

LETTERS OF INTRODUCTION

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

QUAECUMQUE VERA

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G OY1

April 19, 1973.

The Director,
Bemetel,
Stichting Bedryfsopleiding Metaal
en Electrische Industrie,
van Stolkweg 34,
Den Haag, Holland.

Dear Sir:

In several recently published studies reference is made to the methodology used by the Bemetel Foundation in their trade training programs. Specifically your approach to evaluation and the employment of consultants appear to be features that differ from the methods commonly used in this country in apprenticeship programs.

From the Dutch cultural respresentative at the Embassy we have received a brochure on your organization, however it appears to be quite dated, the statistics given are only to the year 1964.

We wonder if later publications do exist and if so, if they are available for study by researchers in other countries. In the event that your major reports are in the Dutch language, this would not be a problem, since this writer is originally of Dutch origin.

The main areas that are considered especially worth of investigation are the system of consultants and the central marking of work projects. We would welcome it if you could send us a list of your publications dealing with these topics, so that we can see which ones we might want to purchase, that is, if same are for sale. If there are aspects of Canadian and specifically Alberta trade training programs which you in turn might be interested in, we would obviously be delighted to supply you with same.

Looking forward to your response to this matter, I remain,

Yours truly,

Paul Hartman,
Researcher,
Room 331 Campus Towers.

PH/kc

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G OY1

May 2, 1973.

To Whom It May Concern:

This letter introduces Mr. Paul Hartman to you. Mr. Hartman is currently enrolled as a graduate student on the Master of Education in Vocational Education Degree program offered at The University of Alberta in Edmonton, Canada.

As part of the requirements for the Master of Education Degree, Mr. Hartman is doing research on the study of apprenticeship training in The Netherlands.

I request that you make available to Mr. Hartman non-confidential material necessary for him to complete his data collection and assist him in any way during the conduct of his study.

Thank you.

Sincerely,

J.E. Gallagher,
Professor and Chairman.

JEG/wc

NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY
11762 - 106 St., Edmonton, Alberta T5G 2R1 Phone 477-4111

May 16, 1973

To Whom It May Concern:

I take this opportunity to introduce Mr. Paul Hartman, who is visiting your country gathering information on Apprentice Education. He requires such information in order to compare the Canadian apprenticeship training with practices prevailing in Europe; in partial fulfillment of requirements leading to the degree of Master of Education at the University of Alberta, Canada.

Mr. Hartman is a prominent educator in technical and vocational areas. At present, he holds an important instructional and supervisory position at the Northern Alberta Institute of Technology, Edmonton, Alberta. He has contributed greatly to the development of technical and apprentice training in Canada through institutional research, writing and teaching. The data which he collects will be treated confidentially and will be used solely for the purpose of the study.

On behalf of the Northern Alberta Institute of Technology I cordially ask you to extend to Mr. P. Hartman courtesy and cooperation in order to make his visit to your country a pleasant and productive one.

With personal regards,

Dr. Karel Puffer, Professional Engineer
Director of Research & Academic Development
Northern Alberta Institute of Technology
Edmonton, Alberta

KP/jl

THE CIVIL SERVICE ASSOCIATION OF ALBERTA
(INCORPORATED MARCH 19, 1919)
AFFILIATED WITH THE CANADIAN FEDERATION OF GOVERNMENT EMPLOYEE ORGANIZATIONS

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TIVE DIRECTOR

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3-2878

10975 - 124 STREET
EDMONTON, ALBERTA
T5M OJ2

May 8, 1973.

TO WHOM IT MAY CONCERN

Mr. Paul Hartman is a colleague of mine at the Northern Alberta Institute of Technology. Mr. Hartman is conducting a study into apprenticeship training - a study that we in Alberta are looking forward to as having a great impact on the industrialization of the Province.

We would consider it a great favour if you would assist Mr. Hartman in conducting his study and give him every assistance that will aid him in this project.

Yours fraternally,

T. Wm. Broad,
President

TWB:gs